

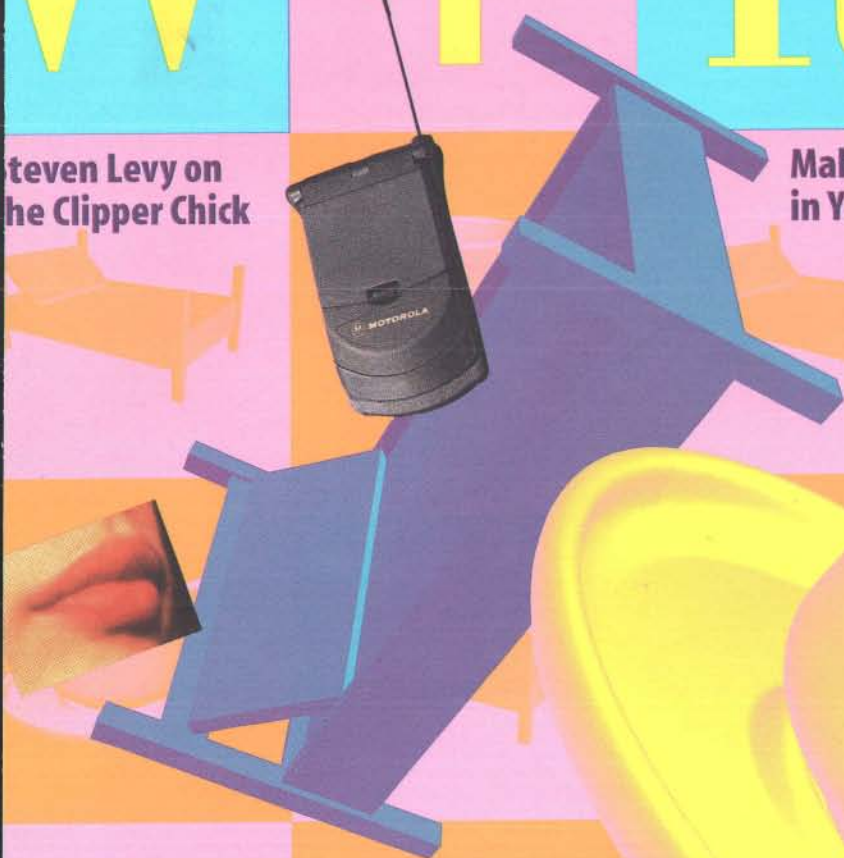
# WIRED

September 1996

Steven Levy on  
the Clipper Chick

Make Special Effects  
in Your Basement!

Barlow: The Powers  
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1st Annual

# Tired Wired 100!





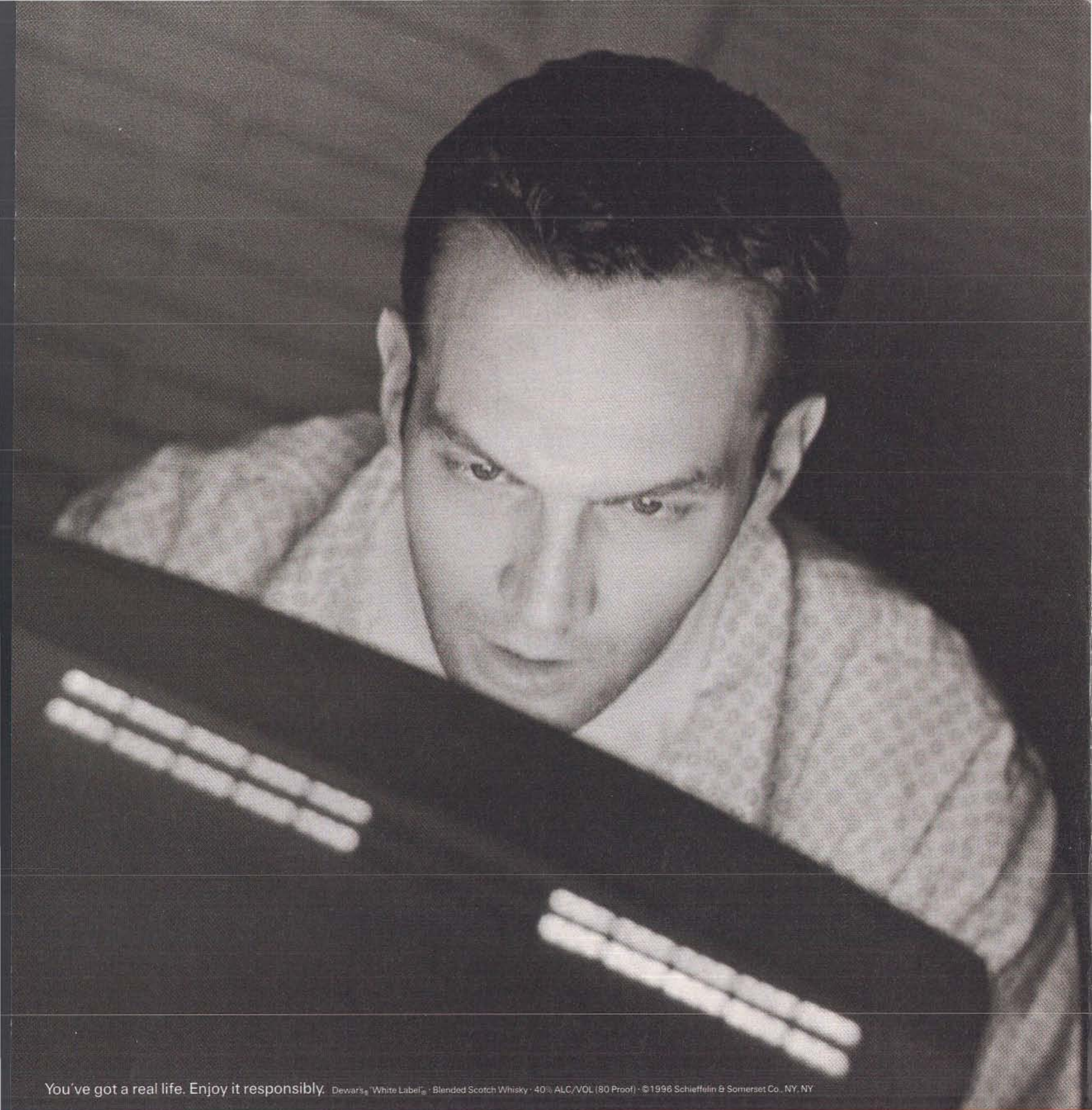
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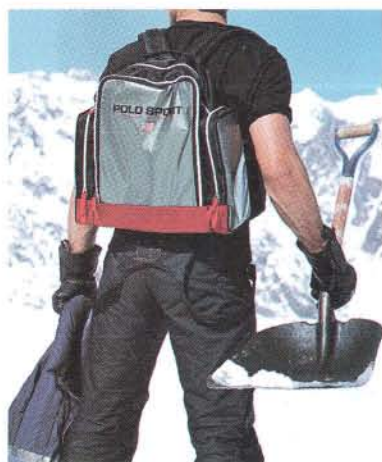
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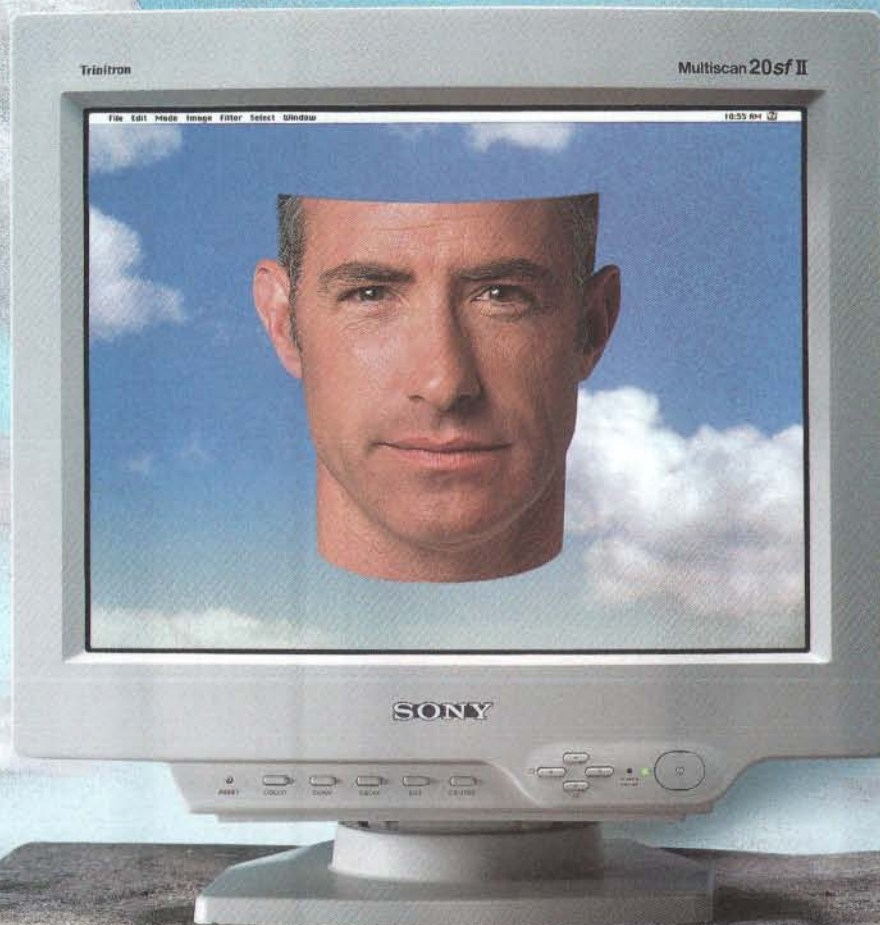
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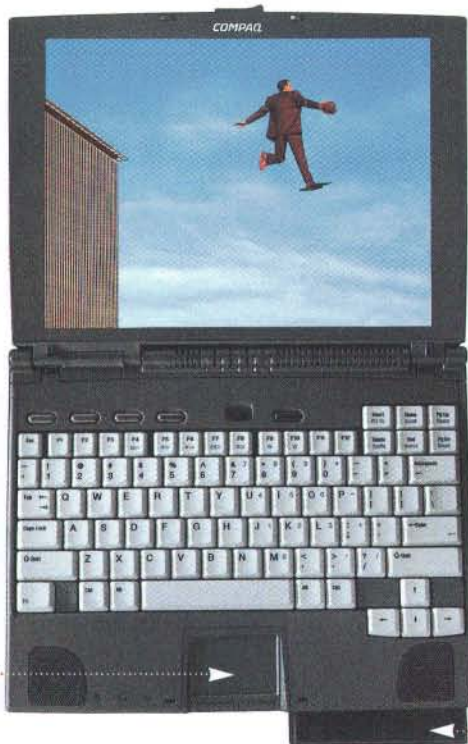
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99

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— John Perry Barlow, page 53



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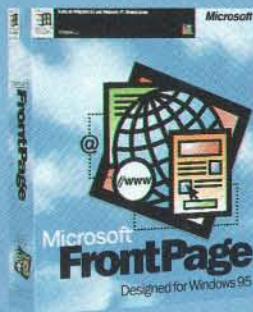
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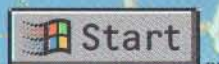
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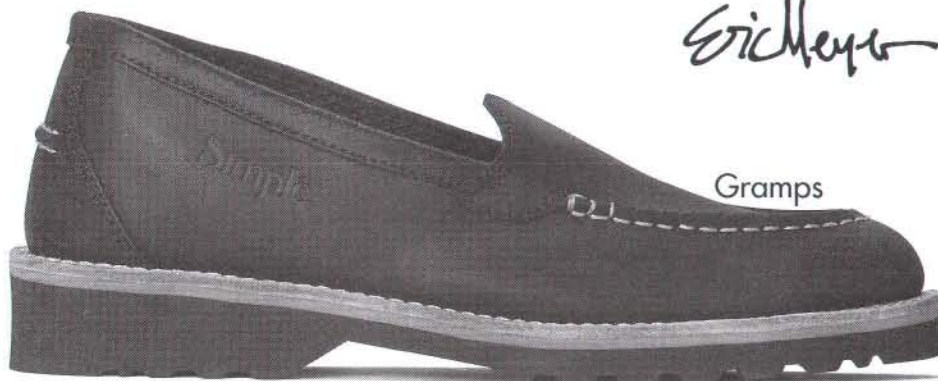
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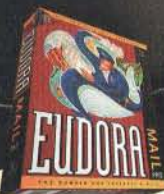


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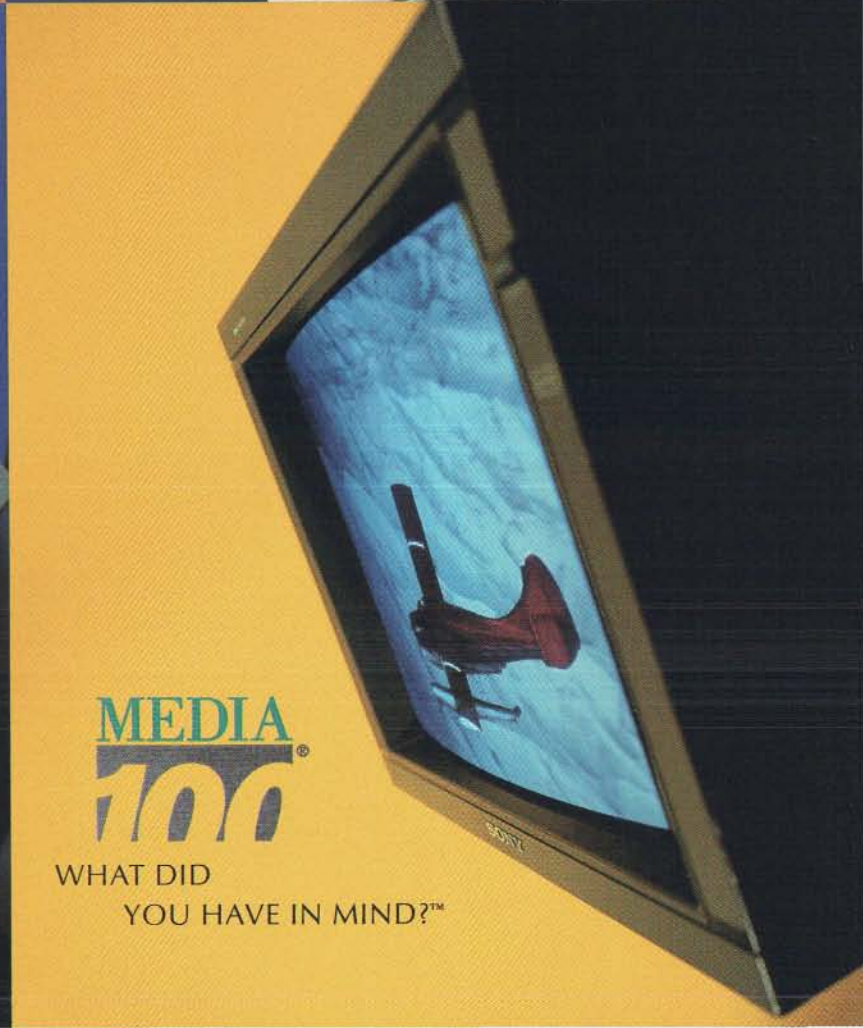
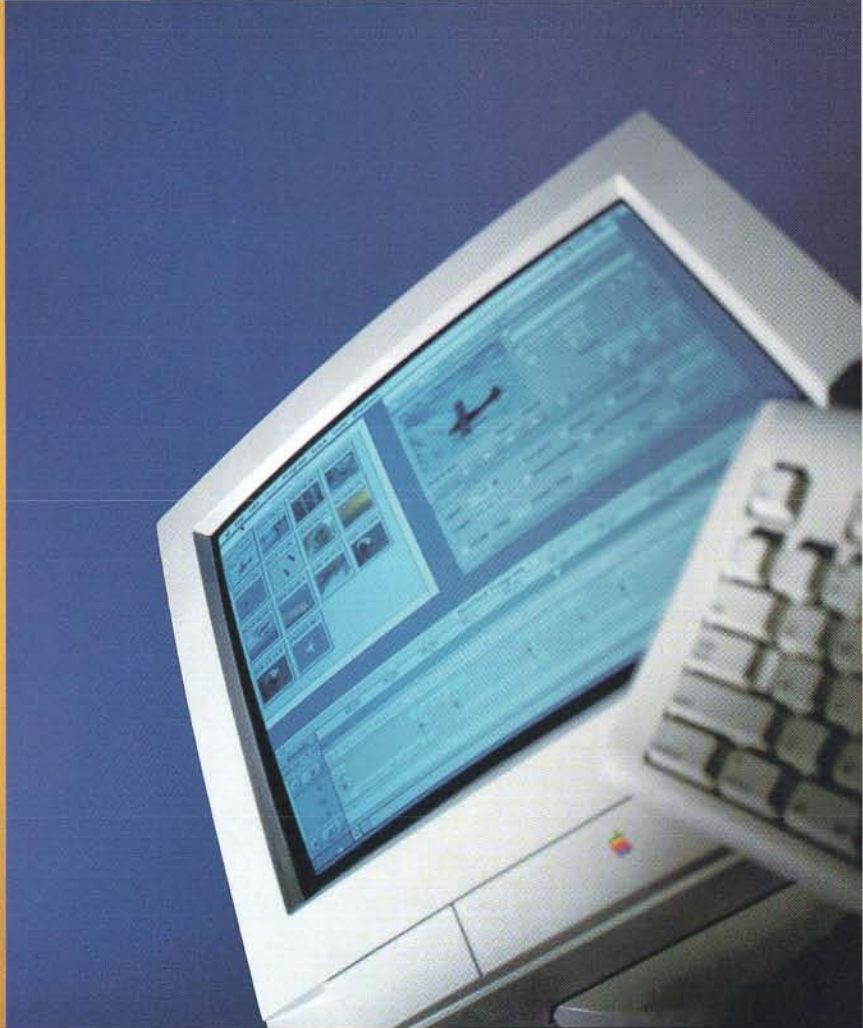
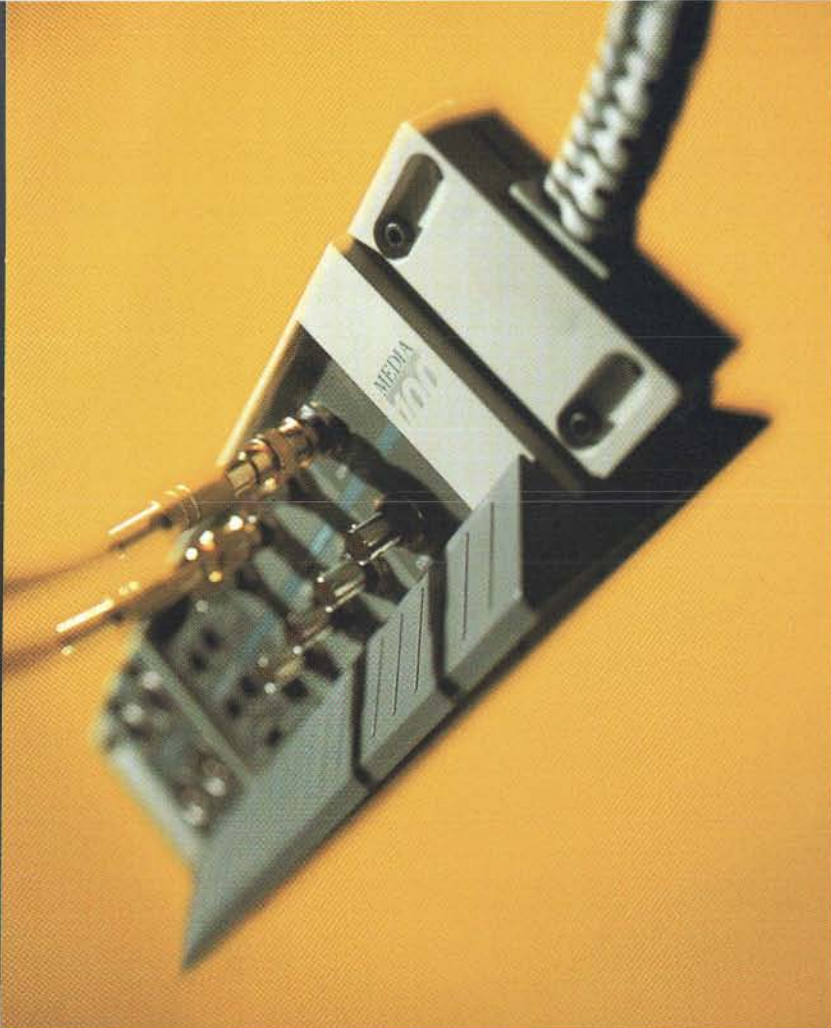
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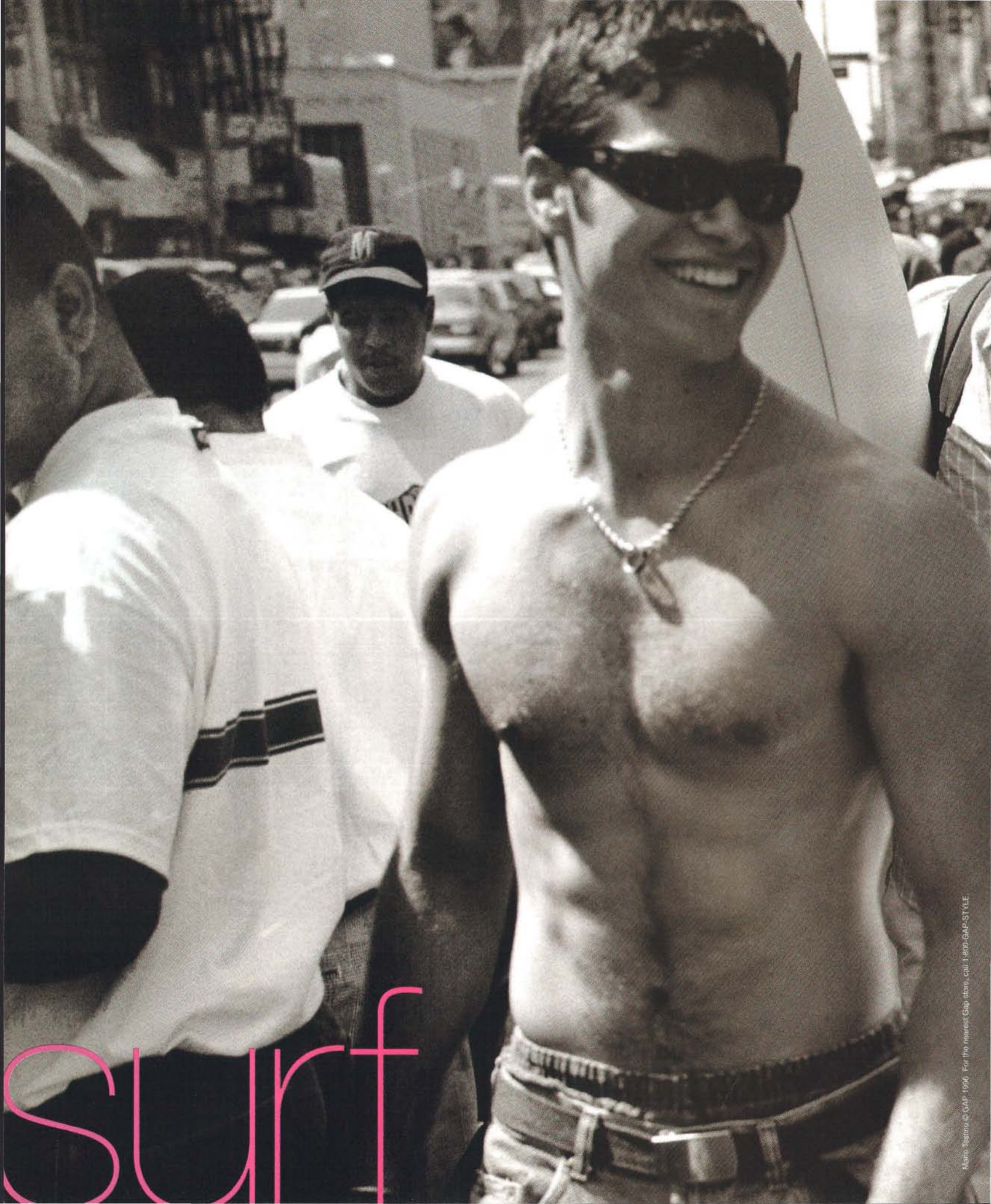
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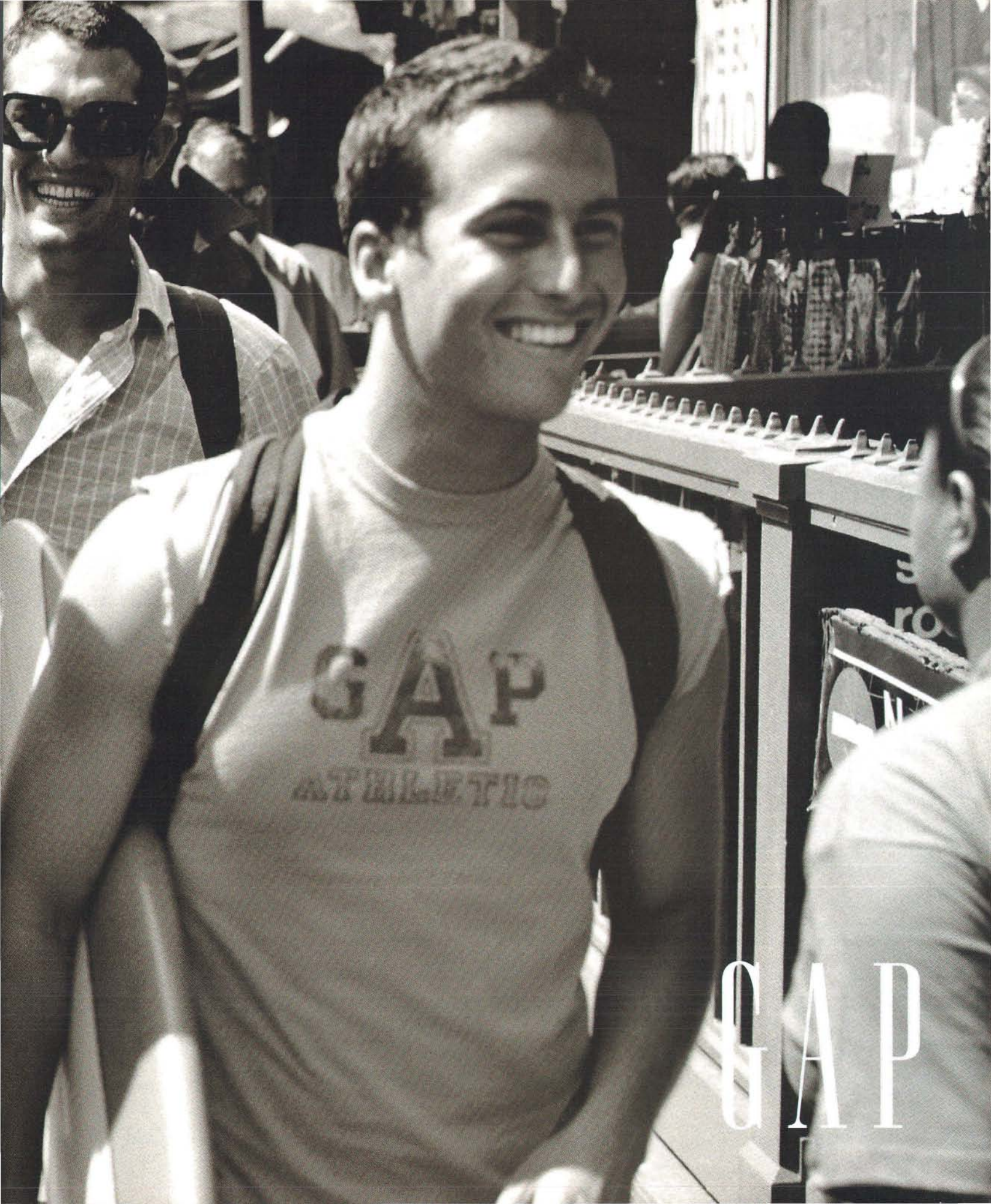
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## Kidding Around

I mean it: "The Rights of Kids in the Digital Age" (*Wired* 4.07, page 120) changed my life. An eighth grader, I've always been a civil rights advocate, especially for children. The article inspired me to do something more. And not just run-of-the-mill, everyday, ho-hum inspired. I mean, really, really, to-the-fiber-of-my-core inspired. I thought your article was pure, complete genius. I will continue my work for civil rights, but I'm upping the ante.

**Tim Eastman**

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As a 14-year-old who cringes at any attempt of the adult generation to hold America in a state of cultural stasis by restricting the flow of information, and who is not restricted (either by parental meddling or personal ignorance) from information provided through most any media, shouldn't I be less audacious than to criticize Jon Katz – the young generation's sole crusader for justice and altruism in a world conspiring against freedom of information, as he so vividly portrays himself.

Not at all; my "audacity" is entirely justified. While I share many of Katz's beliefs about the necessity of providing children with the tools and knowledge to access information, I find his arrogant definition of a "responsible child" and his declarations of how to rear children and which rights children should be granted to be supremely demeaning and unfathomably megalomaniacal.

The article's mandates, rigid definitions, and contracts epitomize the "hypocrisy" for which he so chastises the media and political elite. Katz preaches John Locke's utopian vision while ignoring its fundamental principle: the *mutual* development of and agreement to a binding set of rules, and the absence of a controlling class.

More disturbing than the article's self-congratulatory, holier-than-thou tone, though, is the author's

cold indifference to (or ignorance of) the article's own central tenet: to self-righteously grant kids the right to see information, but deny them the opportunity to develop their own impressions of it, to let kids have access to new ideas, but immediately brand all exposures as good or bad, so that children won't have the chance to forge their own value system or wrestle with ethical dilemmas for themselves. The adult world is both afraid to deny children access to information, and afraid to grant it uncensored – by the V-Chip or Net Nanny or a parent's guiding hand – because, without a conscience-in-the-flesh to oversee a child's every thought and pass on the flagrant stereotypes and sweeping generalizations of society's octogenarians, children

might become what is perhaps the most horrific, the most frightening, the most dangerous thing to an uncertain parent: a grown-up.

**Ben Helfinstein**

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## Constitutional Theory

It smacks of extreme arrogance for Alvin Toffler to suggest that the Constitution doesn't apply to issues such as cyberporn and Net connections ("Anticipatory Democracy," *Wired* 4.07, page 45). The forefathers knew that their work would require change periodically and built in provisions for amendments; they also created sufficient impediments to so-called visionaries like Toffler by requiring a majority of

Congress to ratify any vision into law.

Even if the Constitution were irrelevant, would you trust the current ruling caste to rewrite it? The same people who brought us the S&L fiasco, PACs, check bouncing, legal sexual harassment, midnight pay raises, Whitewater, and other new-and-improved corruption? Do these individuals have the vision to carry us through another 200 years?

Digital technology has the power to change our lives, but there is a role for government. Cooperative devolution and anarchy is the stuff of fairy tales and *Star Trek*.

The Constitution was meant to protect us – in spite of ourselves – not to suit the whims of a particular period in our country's history. Amend? OK. Rewrite? I don't think so.

**Thomas Olsen**

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## Enough Decency

In the four issues you have published since the Telecommunications Act of 1996 (*Wired* 4.03 through 4.06), readers have been treated to voluminous



might – heaven forbid! – develop ethics different from those of their parents.

Historically, parents have postured and assumed façades of superiority or supreme correctness. The rebellion that marks adolescence to the point of cliché is actually the almost inevitable result of the child realizing that the parent is not always right.

Katz's article, through its pedantic psychobabble and less-than-mediocre pop psychology, simply repackages the age-old (but flat-out wrong) message that there's no substitute for a parent's watchful eye when it comes to a child's exposure to media of any kind; if a child is allowed to roam free in the oh-so-frightening world of cyberspace, unencumbered by adults' severe and age-old prejudices, he or she



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commentary on the Communications Decency Act. Some of this commentary – such as William Bennett Turner's excellent "What Part of 'No Law' Don't You Understand?" (*Wired* 4.03, page 104) – has been insightful and useful. I am amazed, however, that only passing reference has been made to the rest of the Telecommunications Act, a 161-page piece of legislation of which only 10 pages constitute the Communications Decency Act.

The provisions of the CDA applicable to online communication are plainly unconstitutional. However, the rest of the Telecommunications Act is the most significant piece of communications legislation in more than 60 years and achieves many broadly deregulatory goals that have been long overdue. The act is already resulting in significant changes to the structure of the telecommunications industry. These changes – influencing how services are structured, marketed, and priced – will have a far more significant effect on the development and use of the Internet than the ill-conceived indecency provisions.

While I strongly support *Wired's* role in airing these issues and sounding the clarion call to resist electronic censorship, I also believe you have failed to adequately discuss the other reforms of 1996.

Jeffrey Carlisle  
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### Back to School

Your "reality check" on "The Future of Schools" (*Wired* 4.06, page 82) left out those who face the reality of schools every day: the classroom teachers. As a fifth-grade teacher in an inner-city Milwaukee public school, I shuddered at your choice of experts – particularly the excessive ink you gave to Lewis Perelman. Here is a person who claims that public schools have equal technology, yet wrote a 368-page book on public education (*School's Out*) without one mention of "racism," "segregation," or "inequality." As a teacher in a 93-year-old building with 11 donated Apple IIe computers plugged into one outlet, I am outraged that you would print the drivel of someone so blind to the savage inequalities eloquently described by Jonathan Kozol. My kids would gladly trade in their Apple IIes for the Power Macs that populate the adjacent suburban schools.

For Perelman, the bottom line is privatization. But I just have to look at my students and at how well the market has treated their families to know that a revitalized public school system is one of the few hopes they have of being real players in the 21st century.

Next time, consider consulting some of us who are a bit closer to reality. And, by the way, I pay shipping costs for anyone willing to make a tax-deductible donation of a Mac computer – old or new – to a group of inner-city kids who would love

to have access to some decent technology. For them, the future is the schools.

Bob Peterson  
repmlw@aol.com

### A Fuller View of Romer

Thanks for the article on Paul Romer and his invigorating theories on economics ("The Economics of Ideas," *Wired* 4.06, page 148). The adoption of these theories by governments and corporations would certainly have a revolutionary impact on both the perception and function of the global economy. However, I am stunned that neither Romer nor Kevin Kelly mentioned that these ideas have been in circulation for many years.

In his 1969 book *Operating Manual for Spaceship Earth*, Buckminster Fuller states, "We find that the physical constituent of wealth – energy – cannot decrease and that the metaphysical constituent – know-how – can only increase. This is to say that every time we use our wealth it increases." Fuller had been discussing the realignment of global wealth concepts since the 1920s.

While Romer's economic model puts these concepts into a strict and usable format for today's economies, Fuller deserves credit for his vision.

Dan McManus  
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### Microsoft Centerfold

Good God! There I was seriously considering whether to renew. But then I received *Wired* 4.06 – with Bill Gates on the front ... in shorts ... half-naked ... with that come-hither look ... and a cell phone ... and virile, manly chest hairs.... There was no choice – I sent my credit card number to *subscriptions@wired.com* immediately!

I have pinned Bill Gates to my bedroom wall. I go to sleep at night admiring that charming little smile and those cute tootsies. I have forsaken my subscription to *Playgirl*. Please, please have more covers that feature half-dressed CEOs of computer companies lounging by the pool or working out at the gym.

Yvonne Hamson  
yvonne@ihug.co.nz

### Privacy Is Dead. Again.

Like "Privacy Is History – Get Over It" (*Wired* 4.02, page 124), Charles Platt's "Americans Are Not As Free As We Think We Are" (*Wired* 4.04, page 82) reminds me of a 1983 article by David Godwin in an issue of *The Futurist* called "Big Brother Is Coming" and the subsequent comment by Gary Willis in his now defunct *Outlander* column: "It's always been 1984."

These days, defenders of privacy rights are large corporations worried about intellectual property abuse. But these companies are really thinking about market control – rights be damned.

When the FBI or any other "official" agency can get into your hard drive or scan your email – and they can – you have no intellectual property rights. Rights belong only to the large financial interests that control the markets, the FBI, and the government.

Everyone's privacy matters. Freedom may be anathema to total secrecy, but an enjoyable free society certainly does depend on honoring another's individual rights to family, the fruits of labor or creativity, and space for private thought and relaxation.

Dev Kinney  
Memphis, Tennessee

### Tack!

Thank you for the great political journalism in *The Netizen*, both in *Wired* magazine and on the Web ([www.hotwired.com/netizen/](http://www.hotwired.com/netizen/)). It has greatly contributed to my understanding of the new economy. I am a member of the Swedish parliament and belong to the Social Democratic Party. As the government party, we are facing the demands of the new borderless world. Without *Wired's* analysis and vision, this task would have been even harder.

Widar Andersson  
Stockholm, Sweden

### Brussels Pouts

In Brussels, May 1996 will go down as one of the bleakest in history, not only because it was the coldest month on record. Indeed, the heart of Europe was left in darkness by the total absence of US *Wired* 4.05.

As the odds for maintaining freedom in the Virtual Universe plummeted (thanks to the Communications Decency Act), public awareness of *what cyberspace is* shrank to the size of a pinhead. The situation was bad; it could not go on....

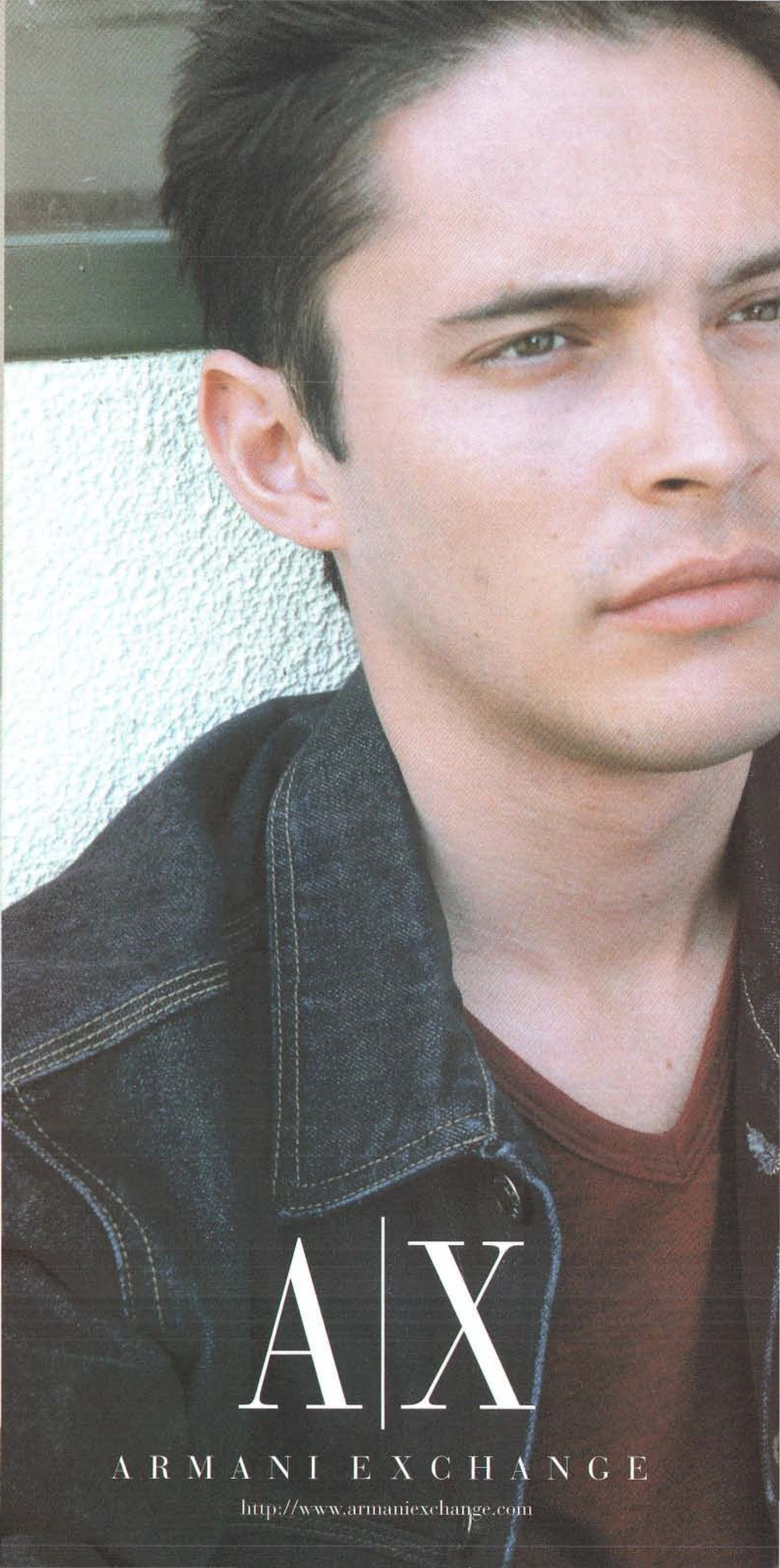
But hidden away in a little cranny *sur le vieux continent*, a trusty little Vector plotted to bring *cyber enlightenment* to the klutzes who move, shake, and legislate in her city. While zapping on the Web one afternoon, Vector had a sudden flash of inspiration ... *Wired!* That was the solution. After all, were not all things explained in its pages? Yet oddly, no one in her Euro-circuit read it. She couldn't fathom why not. If Vector could only find a way to make her peers more aware of its importance. With the US *Wired*, the average Brussels nerd would no longer need to plow through the insurmountable, incomprehensible Euro-jargon. At last, Euro-nerd would be freeeeeeee and ready to clamber into space.

It all looked so good. Had so much potential.

But our tale ends sadly; it was not to be. Though our dogged Vector knows in her heart what could have been achieved ... the US version of *Wired* didn't land on planet Brussels: it was nowhere to be found, could not be bought at newsstands or bookstores.

Aurore Lester-Smith  
aurore.lester-smith@infoboard.be





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## Buggy R-Tech

If "futurist and economist" Albert Bressand ("R-Tech," *Wired* 4.06, page 138) is going to base his model of the future on his insight into the past, he should start by getting his facts straight. A number of points he makes in the interview with Peter Schwartz show that both have serious gaps in their grasp of the history of technology and markets.

For example, Bressand claims (and Schwartz nods) that the train and telegraph created the sense of certainty that made possible – for the first time in history – the emergence of futures markets. The first legally recognized futures market opened in Japan in 1730, and informal trading of futures went on for centuries around the world before that. Futures contracts have been found on clay tablets in cuneiform. To have a futures market, all you need is a bunch of people in a fixed geographical area who make their living buying and selling commodities and agree to certain rules of conduct. Technology (excluding writing) has nothing to do with it.

Earlier, Bressand says that without the telegraph, the train would have been "just a faster pony express." First, the Pony Express was the telegraph system. It carried telegraphs to regions that did not yet have wires installed. So without the telegraph, there would have been no Pony Express for trains to be faster than. Second, early locomotives were distinctly *slower* than galloping horses for the simple reason you can't send a large machine barreling down a track at high speed unless you have some way of "keeping track" of what's going to be around the bend. Third, the first models of "the enormous industrial company" were railroad companies, not "mainstream production companies." And they did not spring up "to take advantage of what was fast becoming mass consumption." They came into being because the only way to build, maintain, and operate a national network of train transportation was through an enormous, strictly organized enterprise.

"Mass consumption" was not the result of trains or telegraphs. It was built painstakingly, one brand at a time, through national advertising made possible for the first time by the mass medium of print. Print as a mass medium did not come into being until after the Civil War and was the result of two critical 19th-century "megamachines" Bressand neglects to mention: universal postal delivery and low-cost printing.

Bressand goes on to rhapsodize that, used properly, the "new tools" will bring us closer to "one world" which will make "war ... [and] barriers among people unthinkable."

This assumes that war is an outcome of misunderstandings between individuals and communities. History shows that wars have nothing to do with poor communication and everything to do with leaders who wish to impose their will on competitors and are willing to roll the dice with their countrymen's

lives and resources. No citizenry has ever organized an aggressive war on its own. Every war has been a "top down" exercise manufactured both physically and psychologically by individuals with the political and economic resources to do so.

What we need from the new communications technology is not "one world" – the dream of people like Genghis Khan and Adolf Hitler – but tools for communities – with their very local, human, and sane self-interests – to assert control over those in control of a superhuman concentration of assets.

**Ken McCarthy**  
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## Notizen

I have had about all the "netizen" crap I can take. What is it with you people? The Net isn't a culture; hippies are a culture, Islamic fundamentalism is a culture, NASCAR racing is a culture. But not the Net.

Why not? A culture has a unifying purpose or glue that sets it apart. It has leaders, icons, heroes, and enemies. What is the Internet's glue: connectivity? instant access? freedom of expression? If these created cultures, we would already have a culture of the telephone, the postal service – even FedEx. Connectivity is a tool and nothing more. Keep it free, sure, but don't hype it into some sort of moral code that "netizens" adhere to.

Really, reading *Wired* these days is like reading *The Watchtower*. You tell the faithful of this phantom culture what to like, dislike, adhere to, and reject. It reminds me of why I canceled my subscription to *Omni*. After a year of UFO hogwash, I switched to *Discover*. Put this Net culture nonsense on your Hype List and stop wasting your readers' time.

**Matt Bishop**  
msbishop@aol.com

## Negropundit

Time for a sanity check ("The Next Billion Users," *Wired* 4.06, page 220). If you want to estimate how many people will attend a Swirlies concert, you could extrapolate ticket sales from last year's event and factor in growing demand for records and tapes. But no matter how many fans the Swirlies have, you can't sell more tickets than concert-hall seats.

Similarly, to surf the Net you must use a computer. There are about 200 million computers in the world today, and that figure is growing about 17 percent a year. (There are multiple computers in many homes, mind you, and not all computers are connected to a network.) But the Internet is adding users at about 17 percent every two months. So, in less than three years, the Web's growth will be terminally limited.

I agree that the Web can be a positive force for change, but first we must shed our fixation on cheer-leading Web population growth. Even if you don't drive a car, the highway system delivers a range

of valuable services: fresh fruit in winter, access to distant hospitals, and a higher standard of living. Arguably, the greatest benefits individuals derive from highways are indirect; it's not a question of "haves" (car owners) and "have-nots." The same could be true for the Internet. One terminal in a village might deliver uncensored news, provide agricultural advice, open an international sales channel, et cetera.

**Greg Blonder**  
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## Some Kind of Shit

The Electric Word column (*Wired* 4.06, page 42) reported that the CDA has chilled the normal clinical, detailed, and earthy (but not prurient) discussions in the rec.equestrian newsgroup.

You sluggish it "Horseshit." I say it's bullshit. As of May 17 rec.equestrian was actively discussing topics such as how well stallions perform with an audience and the potential of various styles of saddles for clitoral stimulation. (The net.consensus grades: Dressage A, Western F.)

**Phetsy Calderon**  
phetsy@usa.pipeline.com

## Metawords

"Metaworlds" (*Wired* 4.06, page 140) are a very limited approach to collaboration over the Internet. Any system that aims at replicating a three-dimensional world will always (or at least in the foreseeable future) seem puny and impoverished in comparison with the real world. It is more promising to design computer experiences that go beyond what is possible in the real world. Computers can be *better* than reality if we design user interfaces that benefit from the things computers are good at, rather than feebly trying to emulate reality.

**Jakob Nielsen**  
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## Undo

- Hyphenated: We dropped a hyphen from the URL for QuickDraw 3D ("Plastic Thought," *Wired* 4.07, page 42). Find the site at [www.3d-active.com/](http://www.3d-active.com/).
- Money Laundering: The TWIT\$ chart in *Wired* 4.07 ("Bargains and Blowoffs," page 74) contained a few errors: The figures listed in the Change since March 1 column for Euphonix and Diamond Multimedia should have been listed under Price April 1; also, the fund holds 3,000 shares of Intel, not 3,500 as printed.
- Spring Fever: We must have been delirious when we mentioned the "spring solstice" ("Microsoft Morphs into a Media Company," *Wired* 4.06, page 126). We meant to say equinox.

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Last winter, when the broadcast industry abruptly abandoned its opposition to the V-Chip, the capitulation seemed a trifle inexplicable. But in June, all mystery vanished when it publicly went after a bigger prize. Republican leaders in Congress demanded that FCC chair Reed Hundt hand over a huge slice of spectrum to the television industry for digital broadcasting. Its potential value on the auction block: up to US\$70 billion. The potential cost to broadcasters: zilch.

No wonder Bob Dole griped last January that it was "corporate welfare" and held up the passage of the Telecommunications Act. And no wonder Hundt seemed to agree, calling the spectrum "beachfront property on the cybersea." But now, Dole's left the Senate, while his fellow Republicans have climbed into the industry's hip pocket.

So far, Hundt is holding out, focusing lately on a plan to have broadcasters devote 5 percent of airtime to public-interest programming, which could include

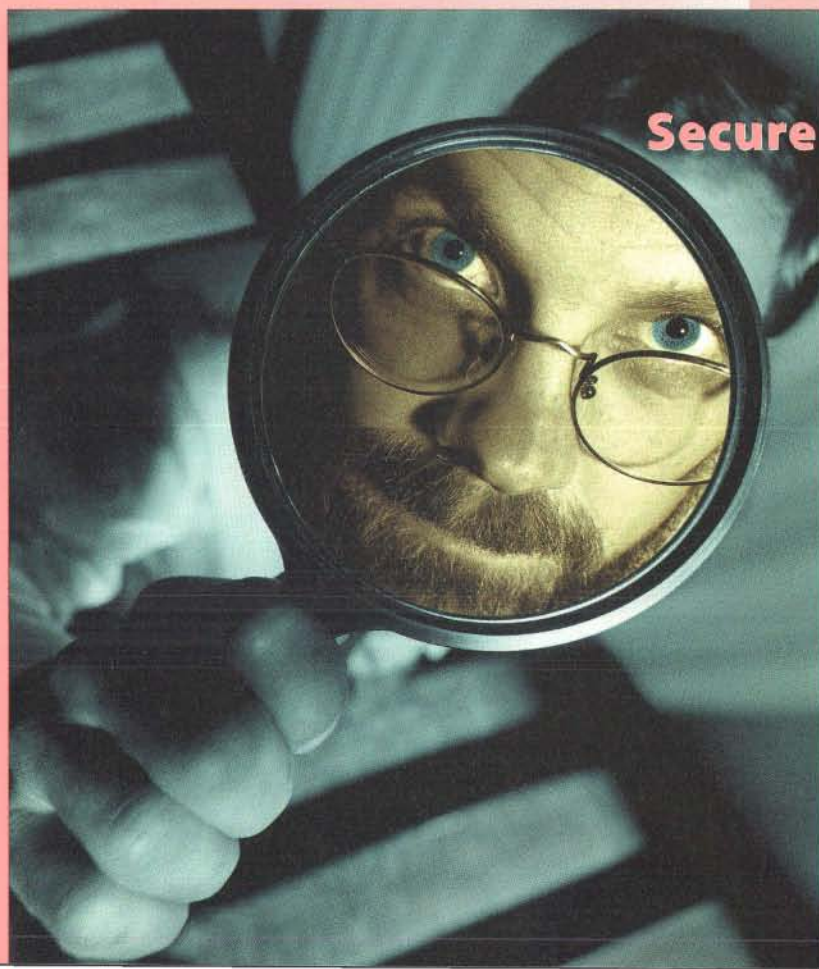
## The Republican Spectrum Heist

educational shows and free airtime for politicians. "I probably should be embarrassed," he says, "for asking so little in return for the public's property."

Not embarrassed - ashamed. And not just Hundt - all of Washington. - *John Heilemann*



E L E C T R I C W O R L D



## Secure Net Commerce - Down to the Sockets

Sure, "online commerce" has a way-new, sexy ring to it, but there's one small problem: security. Well, this August, the venerable National Computer Security Association launched its secure Web site certification program: a series of remote tests, an on-site assessment, and a barrage of hacker attacks that evaluate the hackability and reliability of a Web site down to the secure sockets layer. Not only will the program improve security overall, it will increase consumer confidence in the Net. As NCSA president Peter Tippett says, "We hope that the security program will be the glue that pulls online commerce together." So before you click and buy, look for the NCSA approval logo. - *Jessie Scanlon*





## The Kinsley Deathwatch

History will remember Michael Kinsley not as a great editor or mediocre anchor of an intellectually bankrupt television show, but as the Pat Boone of the Web. Think about it:

The more censorious members of '50s society couldn't stomach a rock-and-roll revolution that was sexual

(Elvis) or black (Fats Domino). So they fawned over Pat. Forty years later, their intellectual kin, who can't stomach a Web they don't control, have a white-bread savior in Kinsley.

Now that his place in Web "history" is assured, Kinsley can turn to his obvious *real* interest: running a print magazine. Expect an announcement of his return to New York or the Beltway sometime before June 24, 1997.

Have your own guess? Email the date to the Michael Kinsley Deathwatch Pool ([deathpool@wired.com](mailto:deathpool@wired.com)) by September 30. The closest guess wins a pair of "war criminal" specs—like the ones Kinsley wore at Oxford.  
— Ned Brainard

≡III What Are They Smoking?: Don't try calling Pakistan on your iPhone. Not content with banning certain forms of mobile communications (see "Motorola Rolls Over Human Rights," *Wired* 3.06, page 46), the Pakistani government has now banned Internet telephony as well. In fact, "voice transmission of any sort is strictly prohibited," reads the legalese binding all ISPs operating in the country. "Violation of this clause shall lead to prosecution according to the

Telephone and Telegraph Act of 1885." Good to see our Pakistani friends driving via the rearview mirror again. For more information, see [www.von.com/](http://www.von.com/). ≡III Old Dogs, Old Tricks: Representative Rick White (R-Washington) and Representative Rick Boucher (D-Virginia) have introduced a congressional resolution urging US lawmakers to figure out this Internet thing and to start using it to communicate with their constituents. "The Communications Decency Act is a pretty good example of what can happen when Congress passes laws on ▶

## Fear Collectors

What are you afraid of? The Fear Project wants to know. Fabrice—the art school founded by Oliviero Toscani, creator of the Benetton ad campaign and *Colors* magazine—is printing a series of "ads" around the world and inviting viewers to submit ideas on the hair-raising subject.

Adam Broomberg, the group head, calls it "an attempt to challenge the language of advertising." Fear, he says, is "a subject matter that is inherent in the mass media but never directly referred to." He hopes the responses to these images will show people's differences and similarities across the globe.

Submissions—including text, collage, electronic art, and photographs—are being printed in a handful of international magazines and shown in a Venice art exhibition this month. Further down the pike, the Fear Project plans to produce a book and a film. — Paul Donald





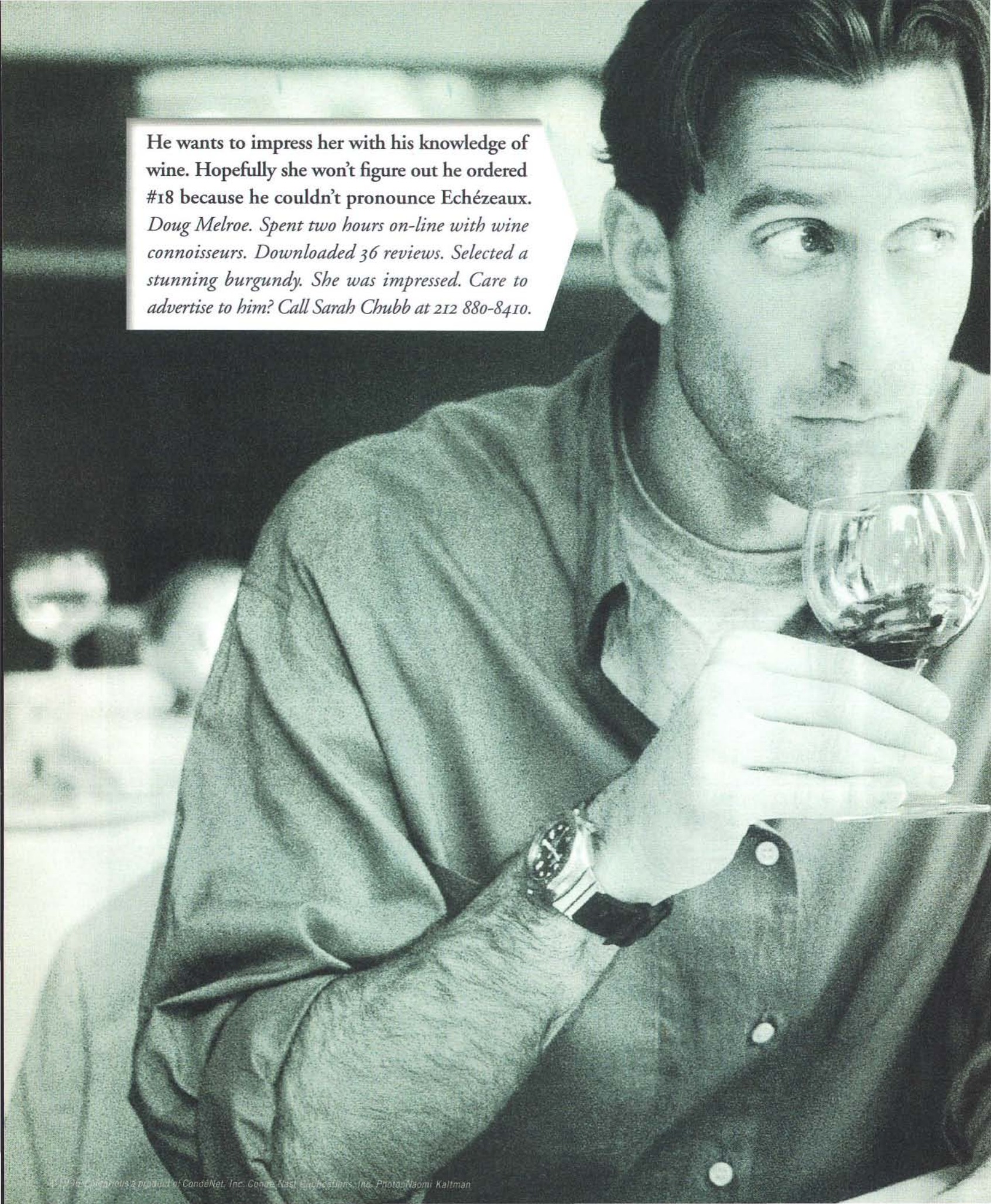
A portrait of Irving Wladawsky-Berger, an IBM executive, with a hypnotic spiral background. He is wearing a dark blue polo shirt with a flame logo and the word 'ATLANTA' on the sleeve. His glasses are perched on his head.

## Mainframe Mind frame

Meet the smartest person at IBM: Irving Wladawsky-Berger. In the 1980s, he convinced Big Blue's brass to move its dying mainframe business into supercomputers. Then, in the early 1990s, he fought to build its microprocessor-based parallel computers into Cray killers, helping take up more mainframe slack.

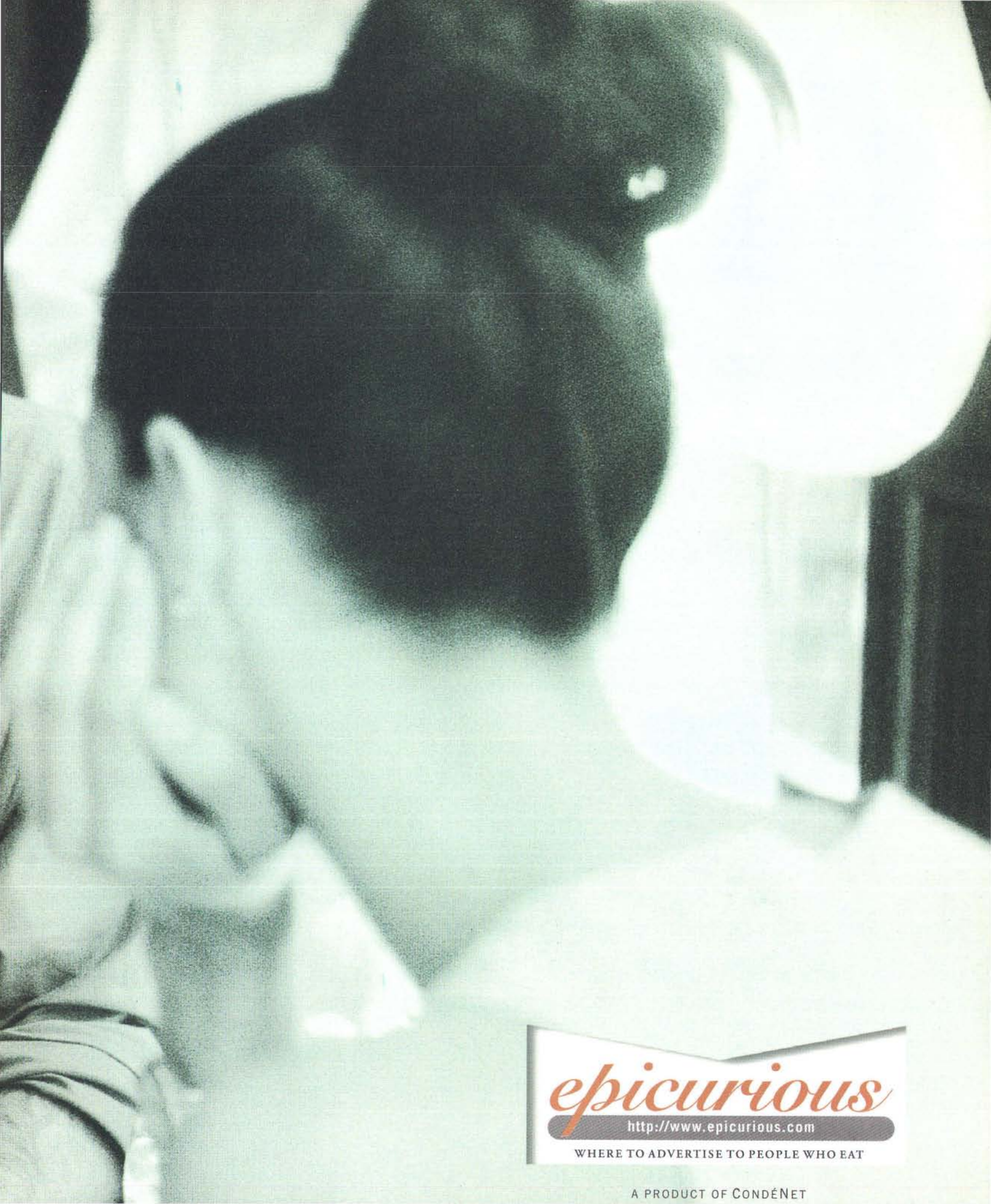
Now he's out to reinvent the mainframe again – this time, it's called a Web server. With Irving as head of the Internet Division, IBM's Net.Commerce system made its début as the Olympic Ticket Server for the Atlanta games. Add in crypto tech, data-mining software, and Internet consulting services – all brandishing the IBM logo – and you get the message: Today's solution for a small planet is a really big server. – Tim Barkow



A black and white photograph of a man with dark hair, wearing a light-colored button-down shirt under a dark jacket. He is holding a snifter glass of wine in his left hand and looking off to the side with a thoughtful expression. A watch is visible on his left wrist. The background is blurred, showing what appears to be a restaurant or bar setting.

He wants to impress her with his knowledge of wine. Hopefully she won't figure out he ordered #18 because he couldn't pronounce Echézeaux. Doug Melroe. Spent two hours on-line with wine connoisseurs. Downloaded 36 reviews. Selected a stunning burgundy. She was impressed. Care to advertise to him? Call Sarah Chubb at 212 880-8410.





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WHERE TO ADVERTISE TO PEOPLE WHO EAT

A PRODUCT OF CONDÉNET



## Net Kids



L'Ouverture Magnet, a public school in Wichita, Kansas, began offering an Internet course last January. By spring, the kids had gone into business for themselves. "We did the homepages for the National Conference for Christians and Jews," says student Lance Nunnery. "They thought our work was great, but when we showed up at



the meeting they kind of freaked out because we're only 11 years old."

All this ended in July, when the Wichita School District issued a cease-and-desist

order. It seems the fifth graders were too much competition for local companies.

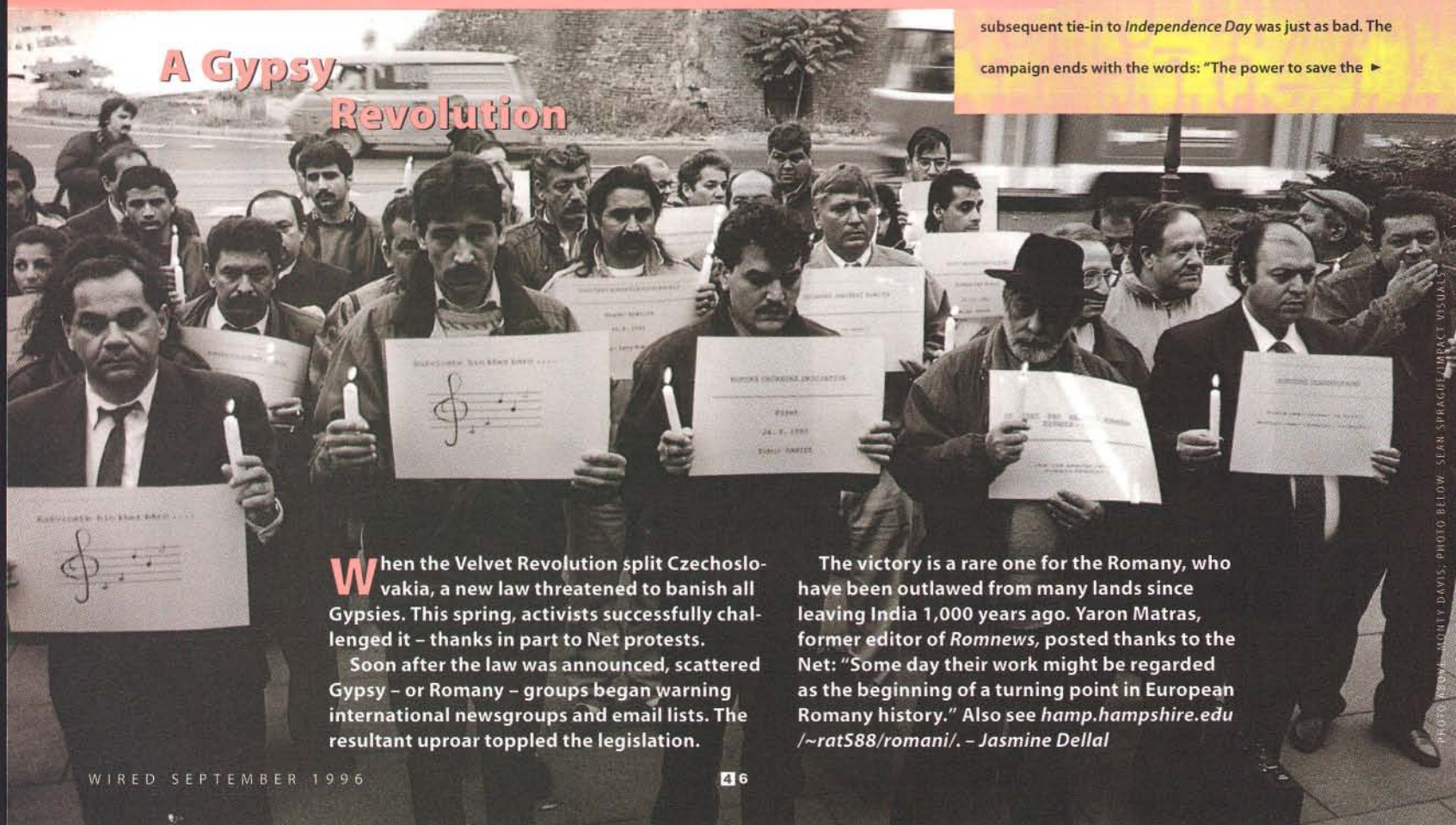
After a recent appeal of the decision, the superintendent granted the students more freedom: they're allowed to work for civic and nonprofit groups. Check them out at [www.louverture.com/](http://www.louverture.com/). Just don't offer them any work. — Steve Kotler

something it knows little about," White says. Once our duly elected representatives get wired, he promises, "a more educated Congress will develop a solution that protects our children and protects our free speech." While we applaud White's utterly non-binding attempt at grandstanding, we remind him: You can lead an ass to water, but you can't make it think. ■■■ AOL Landfill: AOL disks have quickly replaced the Publishers Clearing House come-ons as the most irritating junk mail we receive. And that's not all.

The disks are plastered across magazine covers, bundled with just about every software title imaginable, and even served with pretzels on airlines. One senses that AOL is starting to get a little desperate in its attempts to feed a teetering growth model that can no longer scale. ■■■ Insanely Mediocre: Whatever happened to 1984? Apple marketing, and its internal messages, are beyond comprehension. While identifying *Mission Impossible* as the kickoff phrase for a multimillion-dollar marketing turnaround is in itself too dumb to criticize, the

subsequent tie-in to *Independence Day* was just as bad. The campaign ends with the words: "The power to save the ▶

## A Gypsy Revolution



When the Velvet Revolution split Czechoslovakia, a new law threatened to banish all Gypsies. This spring, activists successfully challenged it — thanks in part to Net protests.

Soon after the law was announced, scattered Gypsy — or Romany — groups began warning international newsgroups and email lists. The resultant uproar toppled the legislation.

The victory is a rare one for the Romany, who have been outlawed from many lands since leaving India 1,000 years ago. Yaron Matras, former editor of *Romnews*, posted thanks to the Net: "Some day their work might be regarded as the beginning of a turning point in European Romany history." Also see [hamp.hampshire.edu/~rat588/romani/](http://hamp.hampshire.edu/~rat588/romani/). — Jasmine Dellal



## Fingerprinting

Thanks to encryption, digital documents can be trusted just as much as paper ones. Digital signatures allow an author to attach an unforgeable John Hancock. And digital fingerprints tell whether a document has been altered.

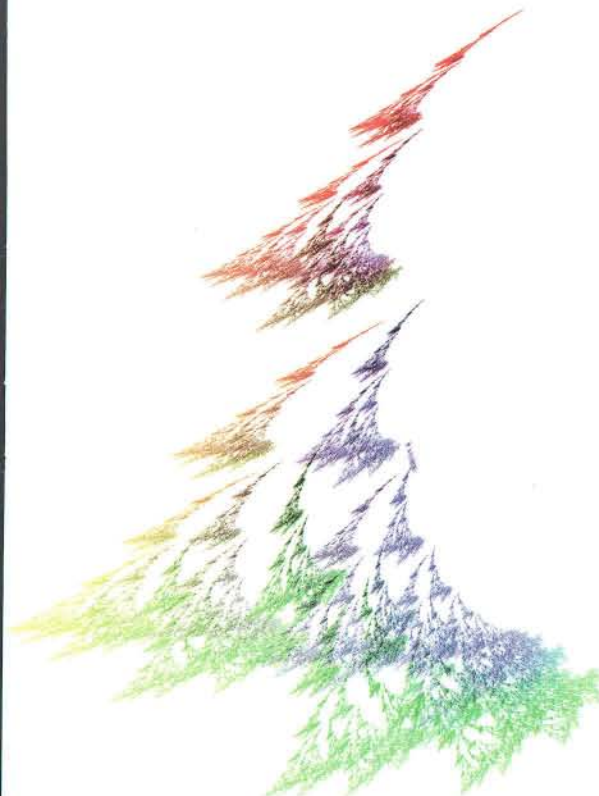
But despite their names, digital signatures and fingerprints are usually mind-numbingly long lists of hexadecimal digits.

To rectify the problem, Ian Goldberg, a UC Berkeley graduate student, came

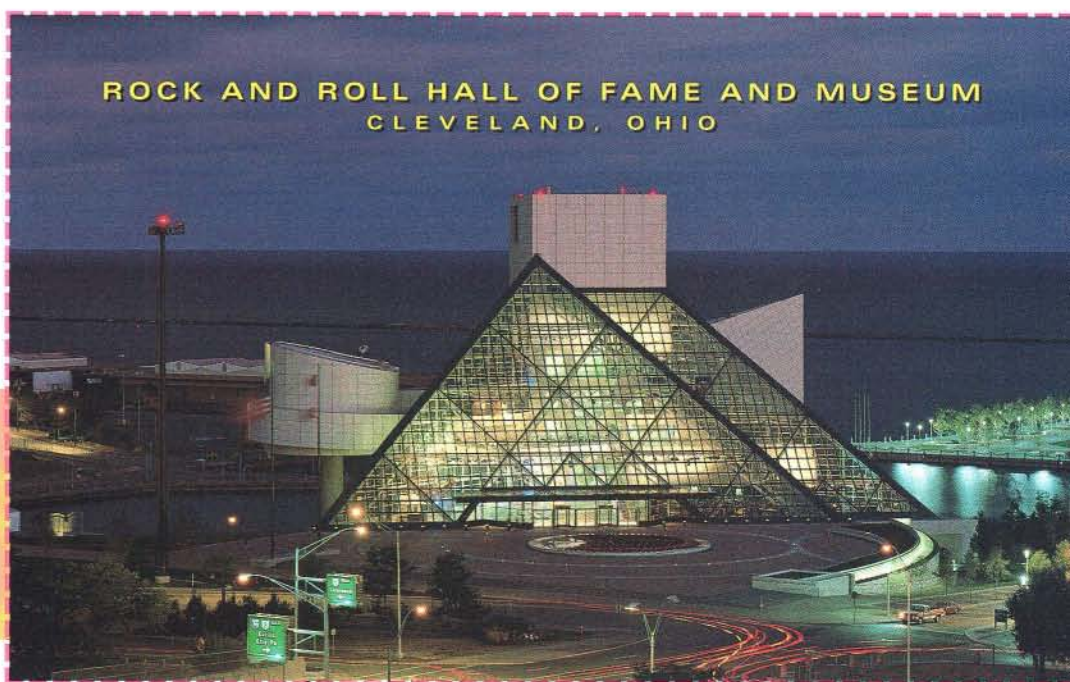
up with a clever program that turns these digital identifiers into unique fractal images. (This one says "Get Wired.") "It's easier for people to spot that two pictures are different than to compare a sequence of hex digits," he says.

Think of it as one more triumph of digital technology. Now not only are signatures almost impossible to forge — they're also in 24-bit color.

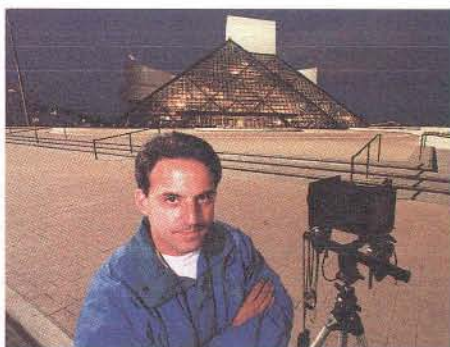
— Calum T. Dalek



► world." To which almost every viewer responds, "Yes, but apparently not the power to save your own company." And Gil Amelio's strategy to win back Apple's luster with an Internet-centric strategy? If you buy that one, head over to [www.mission.apple.com/](http://www.mission.apple.com/) and see what hell Apple's Web geniuses have wrought. One tip: save early and often. A recent visit to that once-mystical Apple campus revealed ►



ROCK AND ROLL HALL OF FAME AND MUSEUM  
CLEVELAND, OHIO



Pei up: Charles Gentile standing before the I. M. Pei-designed museum.

## Postcard

Dear Museum,

In April, you filed a lawsuit against photographer Charles Gentile for selling posters of your museum, claiming the publicly financed building is trademarked. C'mon, a trademark on a *public* landmark? Get real! Like the proposed copyright law, this is a cheap play for property that is public and should be free.

Sincerely,

STAMP

TO:

Rock and Roll Hall of Fame and Museum

1 Key Plaza

Cleveland, OH 44114



## A One-to-One

**K**arl Marx warned that capitalism eventually would treat all human beings as commodities and reduce all relationships to nothing but transactions. But even he couldn't have conjured up CyberGold. The new Internet marketing company (based in Berkeley, California, no less) plans to act as the go-between for businesses that want to pay viewers to read advertisements on the Web. This is not pure insanity: the fledgling company boasts some big backers –

marketing guru Regis McKenna and legendary ad executive Jay Chiat.

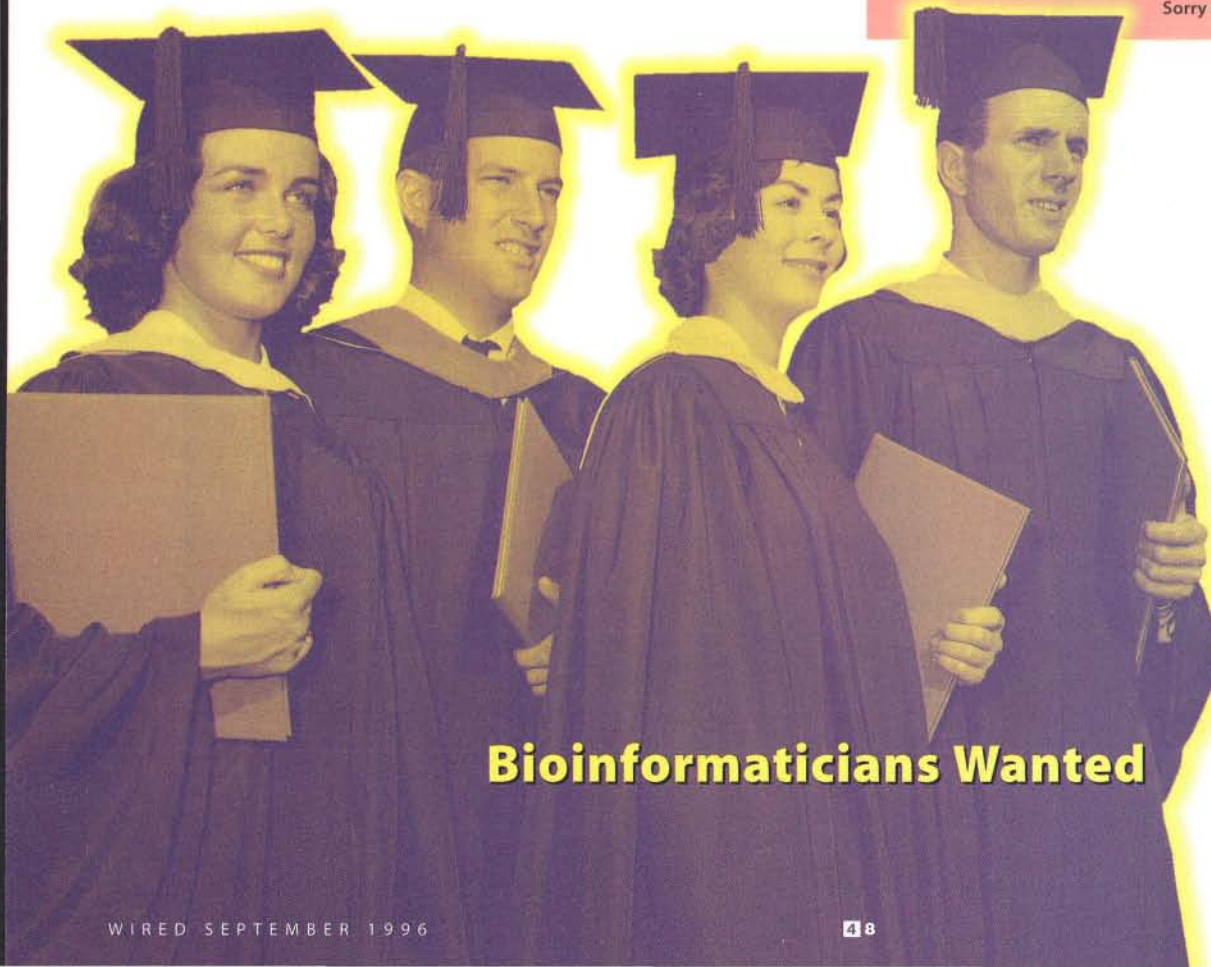
Yet plenty of potential glitches lie ahead: Rumor has it hackers are building programs that automatically fill out the interactive questionnaires to get the 50-cent credit. A lot of online content providers might do all they can to sabotage CyberGold's efforts and keep advertising dollars flowing their way. Maybe even Karl will finally rise up – or roll over in his grave. – *Peter Leyden*

## Web Future



► handwritten signs above the bathroom light switches pleading "Please Turn Off as You Exit!" Those few longtime employees still haunting the corridors spoke of either leaving (like everyone else), or of how they could keep their jobs by incorporating Apple's latest (and probably last) cult message: "bottom-line thinking." One even went so far as to claim his goal was to beat clonemaker Acer at its own game. Sigh. The bloom is off the rose. ≡III No Me Digas: The Spanish-language version of Microsoft Word has an interesting thesaurus. Say you want another word for *Indian*. The thesaurus will spit back *man-eater* or *savage*. Not exactly a PC response given that most Mexicans have Indian blood. How about a synonym for *Western*? The Spanish-language version of Word gives you *Aryan* and *white*. Microsoft issued a formal apology for what was obviously an inside hack, but then had the audacity to claim, in the words of a Mexican spokesperson, that "if you check these words in most dictionaries, you will find the same definitions."

Sorry Microsoft, but it just ain't so. ≡III



## Bioinformaticians Wanted

**D**reaming of entering a hot new line of work where you'll be deeply appreciated and handsomely paid? Become a bioinformatician! All it takes is a few advanced degrees and rich expertise in the fields of genetics, molecular biology, and computer science.

It's a growth job for the new millennium. Bioinformaticians are being offered starting salaries ranging from US\$65,000 to \$100,000.

The deluge of data from the Human Genome Project has created a need for experts to make sense of it all. Drug and biotech companies are eager to turn the information into blockbuster products.

Doug Brutlag, a Stanford bioinfo researcher, says it'll be years before supply catches up with demand. "This field is only going to grow," he says. Apply now. – *Russ Mitchell*



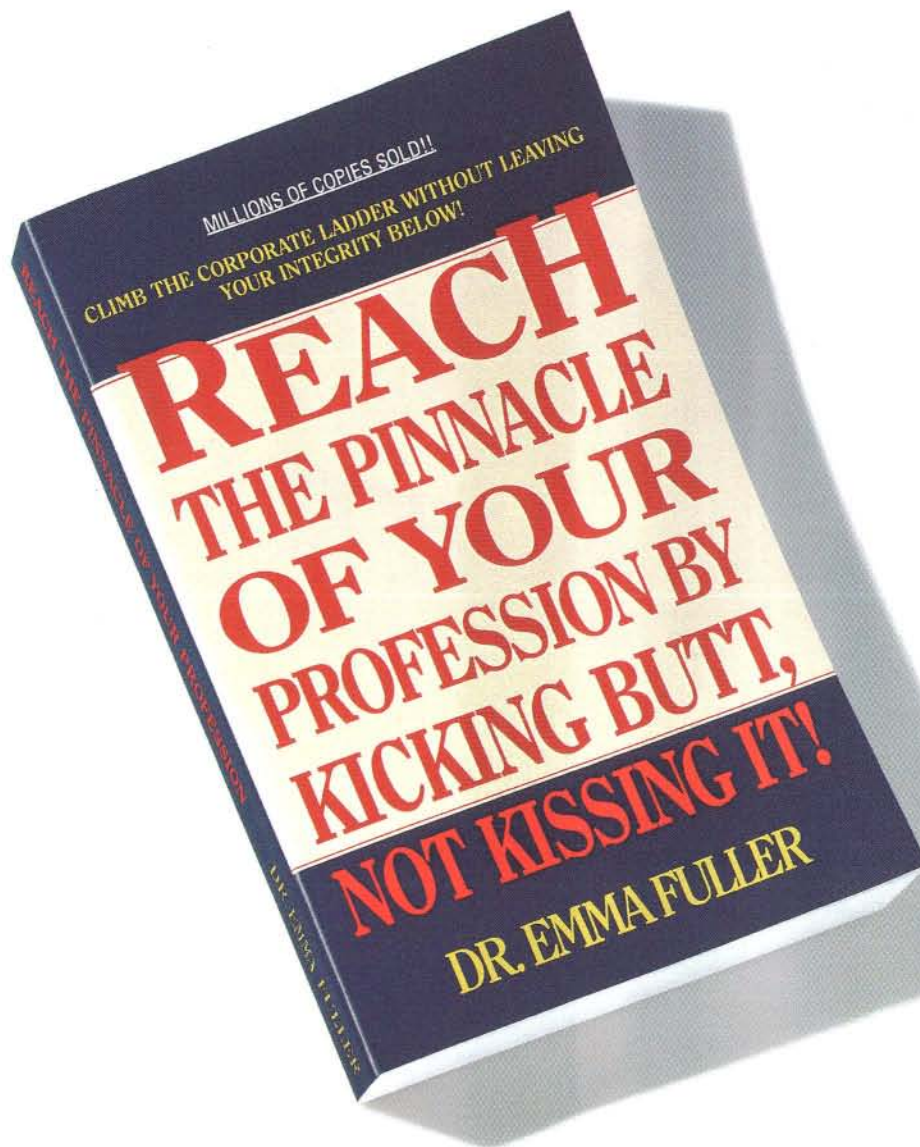
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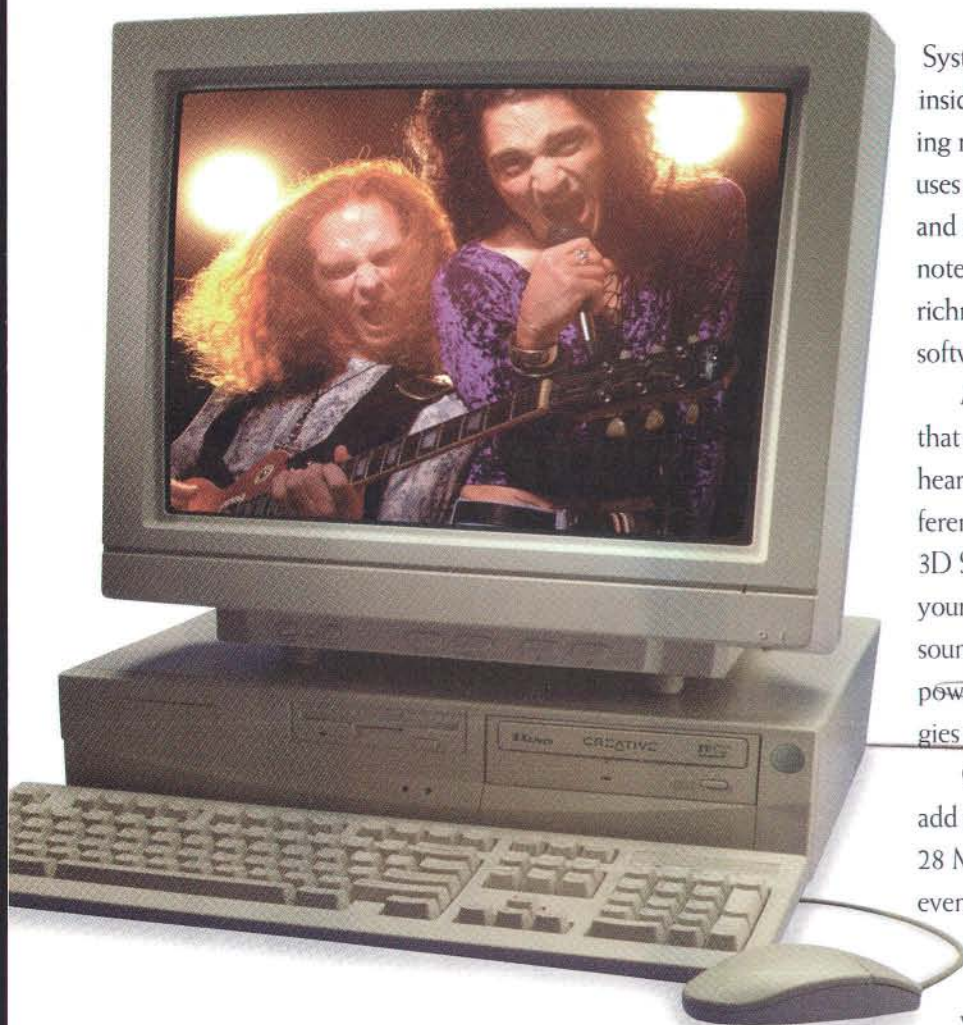
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# The Powers That Were

**The US is no longer a democracy, but Government by Hallucinating Mob, driven mad by television. Little wonder then that this year's election feels like a choice between cancers. Take heart, because by the time we can elect enough of our own to make a difference, the Net will have changed society so much that the US Senate will seem about as relevant as the House of Lords.**

By John Perry Barlow

**R**ecently, I found myself appearing on a panel called "Presidential Campaigning from 1960-1996: From Televised Debates to the Internet and Beyond." I expected the title to be optimistic, and it was. Not only did we not press boldly on to those unimaginable hustings "beyond the Internet," we didn't quite make it past television. Which was fine, I suppose - neither has politics in America. Whether or not it ever will, at least before the United States of America ceases to be a clearly definable political entity, is the question. But does this matter much to the development of society in Cyberspace? Should the netizen bother to vote? And if so, for whom and on what basis?

I was an oddity at the gathering, which was held at Harvard University's John F. Kennedy School of Government on the fallen president's birthday. (I sat there imagining the tachometer reading on my buried father, a cowshit-on-his-boots Wyoming politician who, had he ever heard of virtual reality, would

*John Perry Barlow is a retired Wyoming cattle rancher, a co-founder of the Electronic Frontier Foundation, and a member of The Well board of directors.*

surely have thought the Kennedys came from there.) The others on the panel clearly belonged to the first part of its title. There was veteran TV newsman Sander Vanocur, one of the questioners in the Kennedy-Nixon debates; Kiki Moore, a former press secretary for Tipper Gore and now a regular commentator on CNN; Lisa McCormack, who is the publications and "online communications" director for the Republican National Committee and who you could tell with one eye was no nerd. And me. I was the token geek.

The program began with long cuts from the Kennedy-Nixon debates, a spectacle I had last watched through 12-year-old eyes and murkily re-remembered subsequently. Seeing them again, I realized that the debates had been important not because they decided the contest for the telegenic young Senator Kennedy - as was pronounced by most observers at the time and has been canonically held since - but because they had fundamentally changed the nature of the office itself. From that point forward, the president became ▶

[www.wired.com/4.09/netizen/](http://www.wired.com/4.09/netizen/)

**This is not political coverage as usual.** *Wired* magazine and its online cousin HotWired have joined forces to produce *The Netizen*, a new magazine/Web site providing an innovative package of daily, weekly, and monthly coverage of the 1996 presidential election, the last campaign of the unwired generation. **John Heilemann** is filing an up-to-the-minute diary of the campaign in his "Impolitic" column on HotWired ([www.netizen.com/](http://www.netizen.com/)).



more movie star than leader, more myth than manager, more affect than intellect. From that point forward, it was more important that the candidate not have a five o'clock shadow than that he have ideas that could suffer scrutiny.

Not to defend the genuinely vile Nixon nor to defame the genuinely dashing Kennedy, but I was surprised by the clarity and persuasiveness of Nixon's actual *content*. Kennedy, on the other hand, said some things that were not very thoughtful, such as his assertion that it was more important for a country to have good missile technology than abundant color televisions. But his *appearance*, the visual semiotics of his virtual self, was as smooth as Nixon's was lumpy. I was looking at the first decisive national instance

in which what a politician said was less penetrating and prehensile than his ability to look like he meant it.

And I have had my own confirmation of this principle. Thanks to C-Span (which, as it happened, carried the Kennedy School panel live) and PBS specials, my own talking head occasionally floats around Televisionland in repurposed snippets of videotape, so if people tell me they've seen me on TV, I don't know the context. Trying to determine it, I ask what I was talking about. They never remember. Though sometimes they say they thought I was

convincing. Of what? I wonder.

The most striking realization that came to me as I watched the tapes was that Kennedy was not so much elected president by television as he was elected president of television – that strange projection from which most Americans have since derived their map of reality.

He also, in some sense, participated in a process whereby television became president. Since then, this medium has defined the national agenda in ways that were often at odds with what might have been dictated by either sense or experience with unmediated reality, until we are left today with what I call Government by Hallucinating Mob.

As I watched the shiny old kinescopes, it seemed the transformation to this malignant new governmental form was taking place before my eyes. During several sequences, it was clear that the most important debater was neither Kennedy nor Nixon but the un-nominated Sander Vanocur, as when he sprung on Nixon that his boss, President Eisenhower, had said that he couldn't think of any policy decision in which

Nixon had played a deciding role. It was a harder and more damaging shot than any taken by Kennedy. I knew that never before had a mere reporter been able to exercise such power in real time before an entire nation.

Afterward, as the line of speakers proceeded till my turn came (the geek speaks last), I heard the bland encomiums that are generally larded upon the Net by meatspace politicians whose knowledge of it, as of other things, descends mostly from what they've learned from traditional media; there were no tales of any real adventures in cyberspace. (Though it must be noted that none of them called it the Information Superhighway.) They talked about the Net as though it were the '90s version of the space program, a wonderful and huge government project that America should undertake for reasons that were not entirely clear. They talked about it as though it might have a role in the upcoming elections similar to that played so decisively by the first televised debates.

I don't think so. And neither, I suspect, did they.

If any large number of our elected American leaders thought that our virtual precincts could affect an election outcome in their world, they never would have inflicted on us the Communications Decency Act nor most of the Digital Telephony Bill. Nor would they be contemplating other such depredations as the bill currently proceeding through Congress that would abolish fair use of copyrighted material in cyberspace, declaring a licensable copy to be made every time a copyrighted work is written into computer memory.

If they thought the hundreds of thousands of angry email messages they've gotten from us over the last few years actually came from bodies likely to walk into a voting booth anywhere in their own districts, they wouldn't still be answering electronic input with such automatic responses as:

Dear Friend:

Thank you for your recent email message to my office.

Please accept this response as acknowledgment that we have received your message and will note your comments. Most of you will also receive an email response that addresses your concern. Given that the postal service may sometimes be the best way to get back to you, please also include a regular mailing address in your email.

This is what I received after Senator Edward Kennedy challenged my assertion that no one in Congress was online. "I'm online," he said. ▶

If any large number  
of our elected leaders  
thought virtual  
precincts could affect  
an election outcome,  
they never would  
have inflicted on us  
the Communications  
Decency Act.







"Write me an email and see."

In fairness, I'm not sure I want Senator Kennedy – or any other senator – reading and responding directly to his own email. Most of Congress is in profound datashock already. Hardly any of them has an attention span longer than an elevator ride. They are located at a level in the informational ecosystem that has become too rich for reason.

Stuart Kauffman at the Santa Fe Institute has studied "complexity catastrophe," in which an organism or natural system is forced by its context to process more information than it can. A frequent symptom of this kind of connection crash is fibrillation – a purposeless, resource-expensive quivering that usually culminates in system collapse. It could easily be said that

**Most voters come from  
a culture that has  
been created by mass  
media – a culture  
quite different from  
the one gelling in  
The Great Conversation  
of cyberspace.**

Congress, indeed the entire government of the United States of America, has already reached this state. But however useless and wasteful I think it has become, there are enough Americans who believe in the comforting myth that their government still works, that its continued institutional existence probably contributes to a calm, however delusionary, among the People.

So I'm not sure it would be a good idea to further inflict the riotous informational fertility of cyberspace upon an organism that evolved in the more temperate

zones of the late 18th century. Thomas Jefferson was one of the most prolific letter writers of his time, and he generally produced five or six pieces of correspondence a day. He would have considered it mad to attempt 50 or 60, as I often do, or hundreds, as Senator Kennedy would have to.

But therein lies the rub, or at least part of it. The political system we've got is too tangled in the parasitic undergrowth of the last two centuries to process or understand what is being created for the century to come.

Certainly, the powers that were want to understand cyberspace. They can tell it's important, or at least that it will be, and, as they would like to go on ruling, they have been setting about in various ways – some terrifying, some hilarious – to rule the virtual world as well. But for the present, there are many factors diminishing their acuity on the subject. For one thing, democracy really *does* work in America. It works in that politicians are extremely sensitive to their market, the people who actually vote. And people who vote have bodies that dwell in precincts. A politician can grab the return addresses from letters he or she receives and give them to canvassing volunteers who

will hustle the votes of the senders on their very doorsteps.

No one has yet tried to canvass cyberspace. The email a politician receives can understandably seem to appear from the ether. It might have been generated by a machine. It certainly might have been generated by someone who can't actually vote, because he or she doesn't even live on the same continent.

Of course, that doesn't mean they're not working on it. Lisa McCormack, the panelist from the Republican National Committee (and a smart operative if, well, a bit of a Stepford wife), talked about how proud they were of Republican Main Street, the virtual village that is [www.rnc.org/](http://www.rnc.org/).

McCormack had some reason to be proud. The site is state of the art. From it, you can order GOP golf shirts or grab, in QuickTime, "The Best of GOP-TV Download" and watch memorable moments from the Republican revolution. They even link to MCI's Net Vote '96 site: there, they hope to electronically register Republicans using the Uniform Voter Registration Form that was created, ironically, by Bill Clinton's Motor Voter bill. ("In two to three weeks, your official completed voter registration application card will be sent back to you. Read through it, check for mistakes, SIGN IT, and stick it in the mail. We have already addressed it to your state elections official. We even cover the postage!")

But as much as I genuinely admired the work she was describing, I wondered how much good it would do them. Because I'm not at all sure there is a significant cybervote to curry. I think most voters come from a culture that has been created by mass media – a culture quite different from the one now gelling in The Great Conversation that is cyberspace.

No one knows much about the civic habits of the wired world. Not everyone even agrees that "we" exist as a society. I do believe, however, that there is a discernible cultural flavor to cyberspace, that whether we're jacking in from Sunnyvale or Uzbekistan, we tend to be libertarian, opinionated, and generally devoted to the free flow of information. Whether or not one comes to cyberspace with any greater mission than emailing one's boss from the road, there is something about this environment that seems to gradually induce a larger sense of purpose. And any large sense of purpose has political implications.

It is my perception that much of the online world is already about pursuing those political implications, by constructing new systems of governance better adapted to a global information economy than those of a 19th-century industrial nation-state. I don't think most of us pay much attention to Washington unless Washington is actively trying to attack the Net. And I suspect that, in America, even fewer of us vote than do among the general populace, where suffrage 195 ▶





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The Jetta GLX: Front wheel drive. Rack and pinion steering. Anti-lock brakes. Dual airbag supplemental restraints. Premium 8-speaker stereo and warranties up the wazoo. 1-800 DRIVE VW or <http://www.vw.com>. ©1996 Volkswagen. Always wear your seatbelt and we've heard some good things about beta carotene too.



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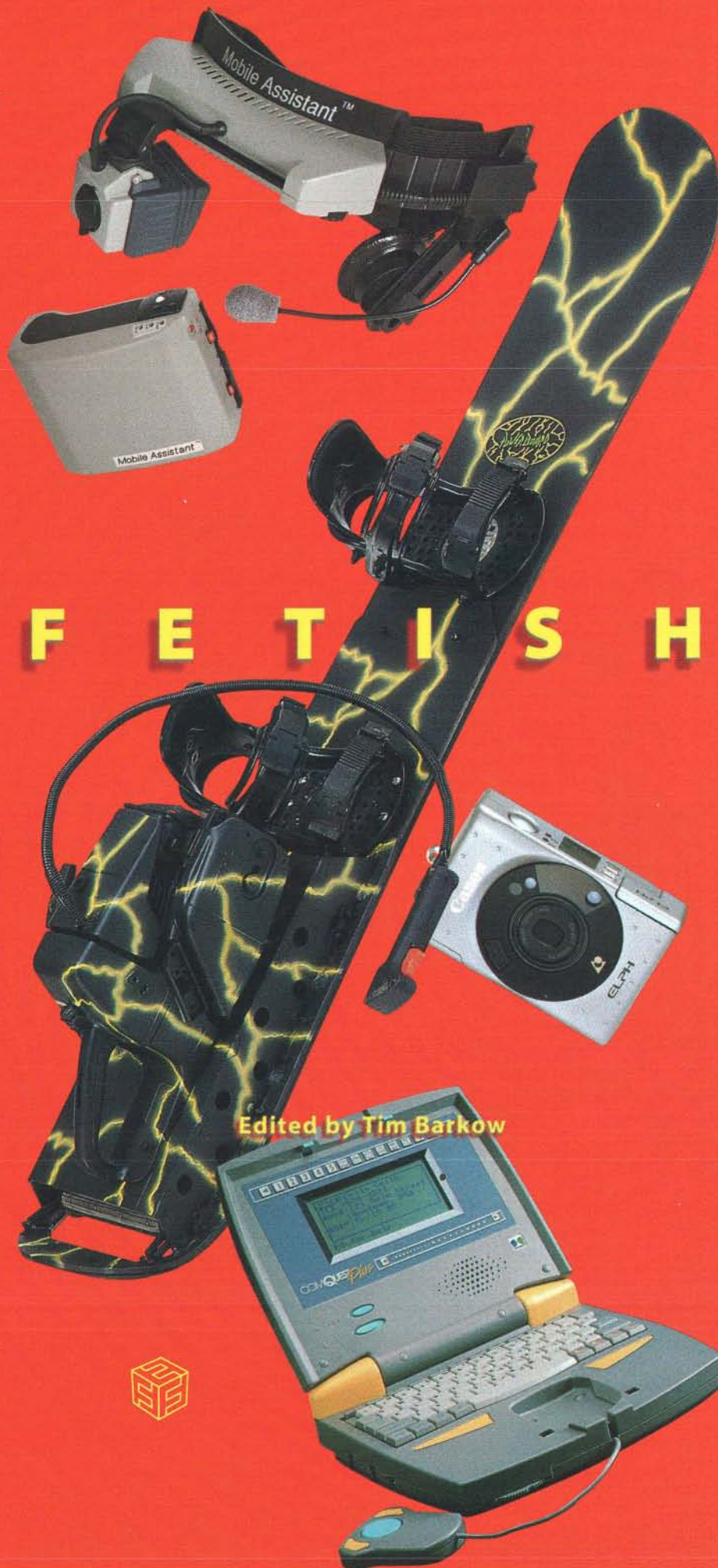


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Going mobile these days ▶ often means heading out with lightly powered equipment. Xybernaut's Mobile Assistant is a wearable computer with the power and flexibility of any desktop PC. Assistant packs a 50-MHz 486 CPU in a belt-mounted box, with PC card slots for adding GPS and wireless LAN capabilities. The included ports allow you to plug into external printers and CD-ROM drives. And the headmounted display lets you work and compute in that stylish cyborg look that's soon to be the talk of the town. Mobile Assistant: US\$8,749. Xybernaut Corp.: +1 (703) 631 6925, on the Web at [www.xybernaut.com/](http://www.xybernaut.com/).

## Byte

Little fingers have a way of getting into things, including your Pentium PC. Keep your kids computing on their own terms with Team Concepts' ComQuest Plus. This bite-sized portable does wordprocessing and has a calendar, address book, as well as word strategy and math games. The optional PC Link lets the ComQuest interface with a regular computer, so your kids can save or print their work under your expert supervision. ComQuest Plus: US\$149.99. PC Link: \$39.99. Team Concepts: +1 (415) 694 4920, on the Web at [www.tchk.com/](http://www.tchk.com/).



Edited by Tim Barkow

## Go

Snowboarders are an independent lot, only truly happy when flying down slopes at high speed, pissing off the more refined skiers or disappearing over the edge of some near-vertical drop to land in virgin powder. Now they can tick off skiers even more by never having to queue for lifts – if they have a Powerboard. When gravity can't help you out, this little baby will get you to even more inaccessible places at a tidy 37 mph. Powerboard: US\$2,385. Cristi Collection: +44 (1647) 433591.

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JOHNNIE WALKER



RED LABEL



## Arc

Marantz claims that the form of its sleek new Arch 1.0 hi-fi was inspired by "the heart-lifting natural arc of green boughs over a country lane." How it got from there to here is anybody's guess (one hopes those boughs weren't chopped down to form the Arch's stylish walnut casing), but the finished product looks great anyway. And with a six-disc CD player, a three-band tuner, and a top-spec stereo amplifier built in, it's going to sound pretty damn good, too. Arch 1.0: US\$1,700. Marantz America Inc.: +1 (708) 307 3100.

## Wet

Toting around a laptop can be more worry than it's worth. What if you drop it or coffee spills on the keyboard? If you're accident-prone, Amrel Technology's Rocky portable computer could reduce your stress level. Rocky's shock-resistant, rubberized case cradles a 100-MHz Pentium with 8 Mbytes of RAM and an 800-Mbyte hard drive. With two PC card slots and a large color LCD, you'll have made no sacrifices but gained the peace of mind that, as Amrel says, "sludge can literally be hosed off!" Can you beat that? Rocky: US\$4,995. Amrel Technology Inc.: +1 (818) 303 6688, on the Web at [www.amrel.com/](http://www.amrel.com/).



## Pod

With the rise of telecommuting and other nontraditional work arrangements, maintaining your workspace has become more than difficult. Nobody wants to share desks, even if you're not at work most of the time. Haworth's Correspondent, an alternative officing solution, solves the problem. An office-in-a-box, the cherry-veneered Correspondent provides plenty of desk space, tack and marker boards – everything your old desk offered. But this workspace locks up at the end of the day. Now you really can box up your job and leave it behind. Correspondent: US\$1,500 to \$2,000. Haworth Inc.: (800) 344 2600, +1 (616) 393 3000, on the Web at [www.haworth-furn.com/](http://www.haworth-furn.com/).

## Lie

"Hi honey, I just got in from aerobics, and I'm too tired to come over. I'm gonna go straight to bed. See you tomorrow." Ever suspected your partner's pulling a fast one on you? With the Truth Phone, there's no need to build your relationship on trust. With its built-in Voice-Stress Analyser, it's easy to tell when someone's pulling the wool over your ears. Truth Phone: US\$3,900. Communication Control Systems Ltd.: +1 (212) 688 8500, on the Web at [www.spyzone.com/](http://www.spyzone.com/).





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M.S.

1/2 a Ph.D

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TOTAL: \$56.98

Required reading  
Texts: \$329.80

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(Just kidding)

My Ex

Me

It's in Your Wallet.

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It's Everywhere You Want to Be.®





## Contact

While pen-based computing is all the rage, most of us just need a little electronic organization. Franklin's Bookman Sidekick offers all that in a small, portable package with surprising flexibility. The Bookman comes with 1 Mbyte of flash memory, two card slots for adding Bookman expansion modules, and Starfish's Sidekick 2.0 for Windows personal-organization software. It also connects to your PC, so you can swap your Sidekick data between platforms. **Bookman Sidekick:** US\$249.95 for 1-Mbyte ▶ **Franklin Electronic Publishers Inc.:** (800) 266 5626, +1 (609) 386 2500.

## Sniff

One thing left out of a virtual reality experience these days is your schnozzle. Not anymore. Ferris Productions's Experience System can add up to seven different odors to the ride. Its zero-gravity-position chair is the same as that used in The Lawnmower Man, and its headset display does stereoscopic imaging with the greatest of ease. Ferris assures us that its smells meet or exceed FDA regulations and don't cause allergic reactions. That would be a little too real. **Experience System:** US\$12,000. **Ferris Productions Inc.:** +1 (602) 470 1177, email [products@ferrisvr.com](mailto:products@ferrisvr.com).

## Safe

With so many computers networked to so many things, any security edge helps. The SecurID system from Security Dynamics adds a layer of protection to your network. User ID cards are synchronized to the ACE/Server software that's located between your employees and your computer systems. Along with their password, workers must input the code shown on the card – a code that changes every minute. Each card is tamper-proof and is uniquely synchronized to the server software. **SecurID Card:** from US\$34. **ACE/Server:** from \$2,450. **Security Dynamics Technologies:** +1 (617) 547 7820, on the Web at [www.securid.com/](http://www.securid.com/).

## Eye

It was a dark and stormy night. Visibility was low, yet I recorded the entire affair.... The Prism DS infrared digital imaging camera fits in your hand and reveals things you never knew existed. The Prism houses a 486 processor and uses flash-memory cards as large as 40 Mbytes to store images. An option you'll want to pick up is the Windows-based analysis software. **Prism DS:** US\$48,000. **FLIR Systems Inc.:** (800) 322 3731, +1 (503) 684 3731.

Thanks to James Flint, Tom Loosemore, and Wired UK.





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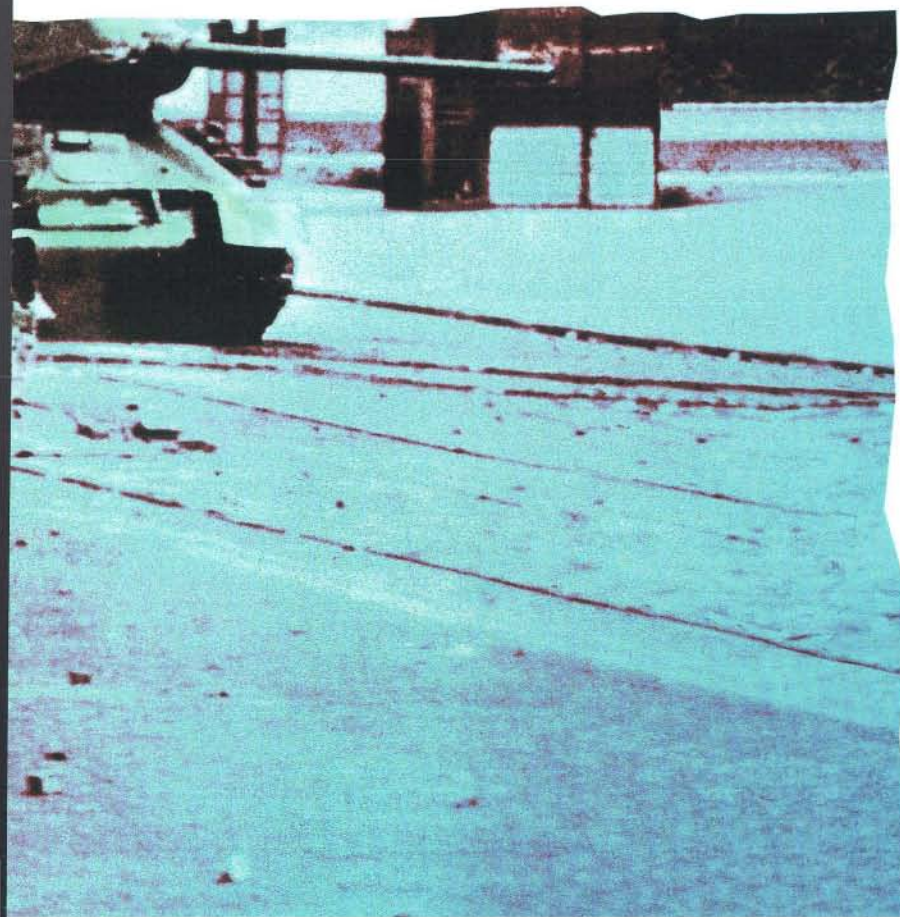


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liberating if you invite  
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# Way Old News

With the same cold eye that sank a million bad headlines, Jim Bellows scans the menu at a Silicon Valley restaurant and orders a way old newsman's iron-gut choice: Philly cheesesteak sandwich. And a glass of wine, thanks – at 73, you're entitled to a drink at lunch. Bellows, who's sat in more top editor's chairs than practically anyone alive, isn't here for his health. "It's like the newspaper wars 40 years ago," he says about his latest incarnation, stoking the editorial fires for the Internet navigation service Excite. "I'm here for the fight."

Bellows arrived at Excite in early 1995, already sporting what he delights in calling "the longest résumé in journalism": Navy Hellcats in the wartime Pacific. Eight newspapers, including legendary last stands at the doomed *New York Herald Tribune*, the *Washington Star*, and the *Los Angeles Herald-Examiner*.

## The man with "the longest résumé in journalism" is helping Net users find what's out there.

Four national TV news shows, a pioneering online news service, and, at 70, a stint as West Coast bureau chief for *TV Guide*.

At Excite, for now at least, his brief is more focused: "My job," he says,

"is to help people understand what's out there and show them where to find it." Bellows intends to do this with Web site reviews – 60,000 and

counting since the company went public late last year. Half a dozen of Excite's competitors offer a similar service; what they don't have is Bellows's half-century of experience giving people what they want. He's even got a mantra: "Tight, true, and somewhat hip, with a little irrever-

ence, but not too much. Be smart, be tart, and have a heart."

Bellows isn't fazed by trying to run his operation on an editorial budget that would barely provide lunch money for some top New York editors. Nor is he worried about Internet publishing's reputation for spewing red ink. "I've spent most of my career around Number Two newspapers that were losing money," he says. "What's new?"

What's new is the

Web, of course. But Bellows argues that the song remains the same. "Publishing – a newspaper, a TV show, a Web site – is about deciding what's important for your readers and creating a personality, a style, a voice. That's what differentiates us from a site like Yahoo!"

That said, Bellows doesn't claim to have a magic road map to the future. "We've taken some little steps," he says. "But it's still a long way to wherever it is we're going."

– Spencer Reiss



Classics: Jim Bellows with an early wordprocessor.



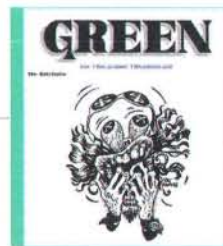
Ken Kurson: bullish on straight talk.

## Score Some Green

Sick of co-workers pestering him with questions about investments, Ken Kurson, a *Worth Magazine* staff writer who specializes in personal finance, produced 15 copies of what today is *Green* ([members.aol.com/greenzine/INDEX.1.HTM](http://members.aol.com/greenzine/INDEX.1.HTM)). Kurson's homespun zine of "personal finance for the unashamed" strips away the jargon to expose the nuts and bolts of the financial market. *Green* is Kurson's way of reaching average Joes and

Janes who have decided to play the personal finance game.

Kurson hopes to maintain his zine roots while offering sound financial advice to the less financially endowed. "Information is being taken from the very few and put into the hands of many," he says. "*Green* is about making sure the many are well informed." – Marissa Raderman







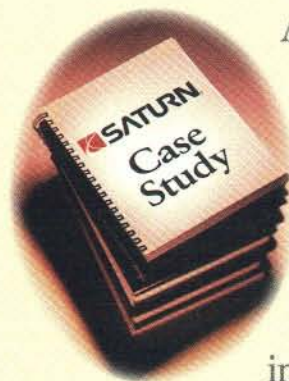
*Saturn is part of the curriculum in Professor David Aaker's class at UC Berkeley. (Go Bears!)*



*I*t seems that besides coupes, wagons and sedans,  
we also make one heck of a final exam.



*We've heard of many instances where Saturns have been given as graduation gifts. (Most of us here remember getting pen and pencil sets.) In that case, we suspect this year's graduating class will be quite impressed with the newly redesigned Saturn coupe.*



Apparently, a Saturn showroom isn't the only place you can go to learn more about Saturn. All across the country, some pretty prestigious universities are offering us up as a case study in everything from organizational

theory to marketing to global logistics. Not only that, we're on the recommended reading list of a few sociology departments, as well. This is pretty



heady stuff, especially when you consider we didn't even exist as a company until a few years ago. And now to be held up as a role model for future MBAs to study, why, it's quite an honor. It's also a very good example of what happens when you do your homework.



THE 1997 SATURN SC1



*It doesn't take a genius to see that part of the Saturn difference lies in the relationship between labor and management. Gone are things like time clocks and foremen. Instead, everyone rolls up their sleeves and makes decisions together. Funny what happens when you treat everyone the same; things actually get done.*

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Straight outta Brooklyn: Rebecca Walker (left) and Angel Williams.

## Girlz in the 'Hood

**K**okobar owners Rebecca Walker and Angel Williams, both 26, have fused the fashion of gourmet cyberlounges with multiculti values to create the first African-American and women-owned Internet javahouse and bookstore. After the two spent months as the only black women in the Espresso Bar, a popular Greenwich Village cybercafé, Williams decided to transport the concept across the Manhattan bridge. Located off the beaten track in the Fort Green section of Brooklyn, Kokobar aims to draw more people of color to the Internet by providing inexpensive access in a public space. "I thought it would be a good idea if someone put an espresso bar in the 'hood," Williams says, looking around at the sparsely decorated café pulsing with hip hop tunes. "The of-color community is in danger of missing out on the information revolution," says Walker. — Rachel Lehmann-Haupt

## Wanted: Home for the Geek Hall of Fame

It's not in Cooperstown. It's not in Canton, either. But one day it could be in San Jose. That's what the folks behind the Silicon Valley Engineering Hall of Fame are hoping, anyway.

are no plans to have a Hall of Fame." Still, Giles insists he's "very supportive" of the SVEC, an all-volunteer organization dedicated to increasing "awareness of how engineering affects the quality of our life."

Lord knows, engineers could use the boost. Engineers are like the Rodney Dangerfields of the labor force: they don't get no respect. Yet a good case

could be made that the pencil-toting slide-rule set has exerted more influence over the shape

program, George Crothal, during the Hall of Fame awards ceremony in February. "When was the last time you saw an engineer on the TV news being hailed as a hero?" Crothal asked. "We save lives!"

It's not that hard to sympathize with Crothal's frustration. Consider the talent and influence of a few Hall of Famers: Frederick E. Terman, co-creator of the Stanford Research Park, was inducted in the Hall of Fame's first year. William R. Hewlett and David Packard got in the next year. And Robert Noyce, the Valley entrepreneur who helped develop the integrated circuit, is in there too.

The game's not over for the Hall of Fame, but it's definitely the fourth quarter. The new

**Engineers are the Rodney Dangerfields of the labor force: they don't get no respect.**

of the 20th century than any other profession.

The status deficit faced by engineers was evoked by the chair of the SVEC's mentoring

US\$59 million Tech Museum is scheduled to open in 1998. Giles insists he is willing to consider providing space for the SVEC. "We'll probably have to reopen the discussion," he says. — Spencer E. Ante



Incognito: These faces should be famous.

The Silicon Valley Engineering Council (SVEC), which created the Engineering Hall of Fame six years ago, claims it has an "agreement in principle" with San Jose's soon-to-be revamped Tech Museum of Innovation to provide a permanent home for the Hall of Fame.

But Peter Giles, president and CEO of the Tech Museum, begs to differ. Giles says the SVEC pitched the idea years ago, although at present "there

## Jargon Watch

**Cold Transfer** An incoming phone call transferred without notice or explanation from the transferring party. "Someone in customer service cold transferred the call to me — by that point the guy was ready to crawl through the wires and kill somebody."

**Dancing Baloney** Gratuitous animated GIFs and other Web special effects that are used to impress clients. "This page is kinda dull ... maybe a little dancing baloney will help."

**Picasso Porn** The semi-scrambled transmissions from adult cable channels that can sometimes be seen (and heard) by nonsubscribers.

**Seagull Manager** A manager who flies in, makes a lot of noise, shits all over everything, then leaves.

**Stalker Site** A Web site created by an obviously obsessed fan. "Have you seen that Gillian Anderson stalker site? The guy's got like 200 pictures of her!"

— Gareth Branwyn (jargon@wired.com)  
A tip o' the tam to Ralph Bishop, Gary Rosenzweig, Brock N. Meeks, and Stuart Constantine.

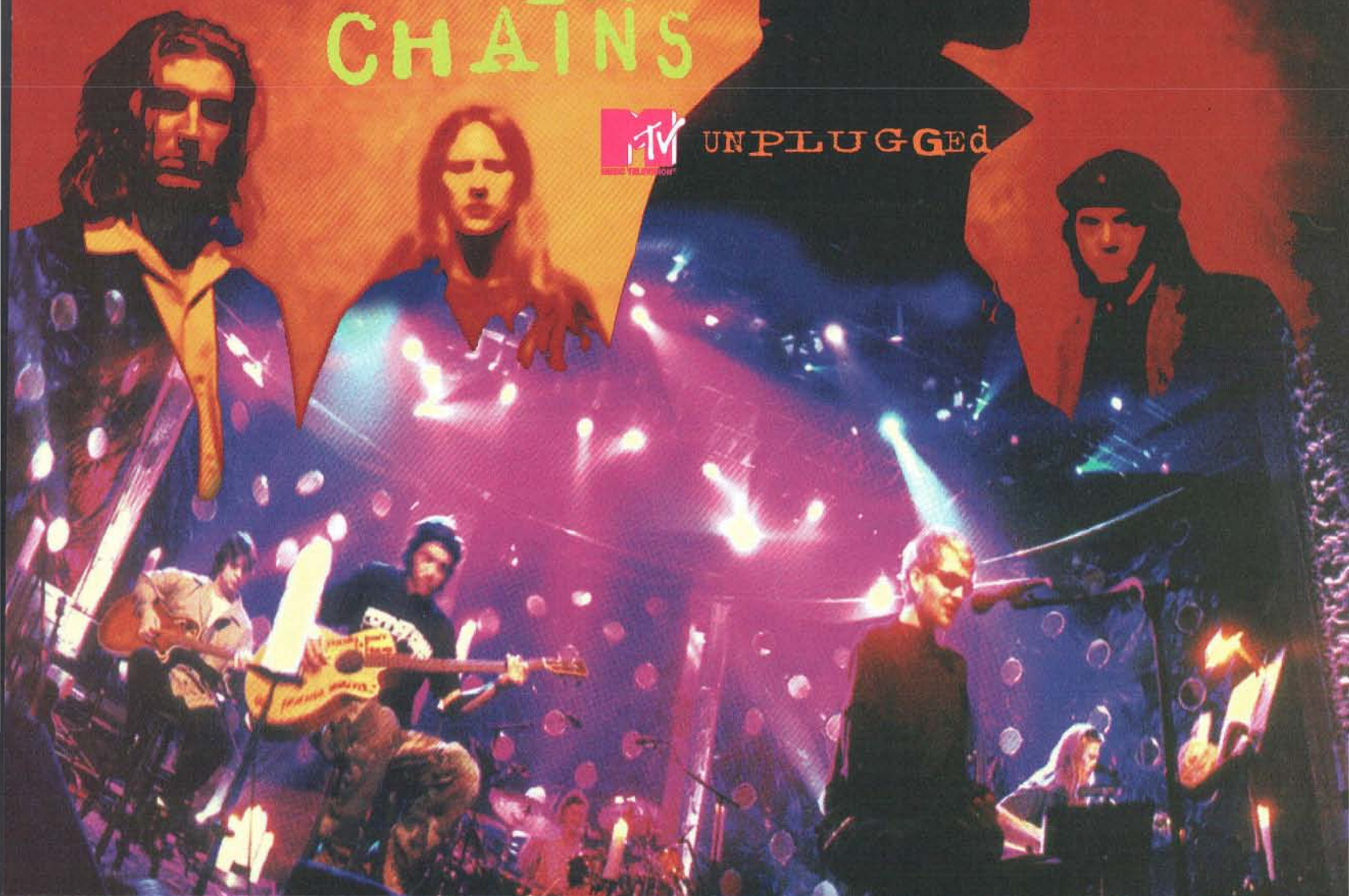


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# Thai in the Sky

Sondhi Limthongkul likes to ponder the big picture. How big? Think 200 channels of local and foreign programs beamed direct to homes across Asia. Late next year, the 48-year-old Thai media mogul will launch the first of two satellites to beam digitized TV to the world's most populous region.

Sondhi's satellites are part of his audacious scheme to build a media empire to rival that of Rupert Murdoch, who owns Asian satellite broadcaster Star TV. Sondhi, an ethnic Chinese tycoon, first dreamed of running a nationwide publication during his days at UCLA in the 1960s. But after masterminding a string of successful



the US-owned market leader, *The Asian Wall Street Journal*.

International media and entertainment, Sondhi says, "is one of the very, very few trades that Asians don't have enough guts to enter." His decision to dive into the fray is motivated as much by local pride as "the need to tell the world what we think." Indeed, Sondhi compares himself to that supremely assertive Asian, Genghis Khan. "I march, I seize

*Times*, which offers an "Asian point of view" to counterbalance



Sondhi Limthongkul: the spirit of Genghis Khan with a spiffy bow tie.

## Sondhi is launching satellites as part of his scheme to compete with Rupert Murdoch.

publishing ventures in Thailand, he expanded his ambitions. In 1992, Sondhi started an Asian business monthly. Last year, he began publishing a regional business daily, *Asia*

the fort, I get somebody who is able to run it, then I keep moving on," Sondhi says.

He faces an army of doubters who think he has neither the financial nor the managerial muscle to back his

projects over the long term. Sondhi is already involved in some 30-odd companies, which include hotel, computer retailing, and mobile phone interests. The main publishing business of his holding company, the M. Group, suffered losses last year because of rising newsprint costs and, Sondhi says, mismanagement by a subordinate.

Sondhi claims the satellites and the paper are personal projects, funded out of his

own pocket. A devout Buddhist, he says life is short: "Whatever you're doing, you have to keep on doing it, without postponing it for tomorrow." So what's the next fort he wants to conquer? The M. Group is reportedly negotiating for a stake in a Hong Kong-based online service. Sondhi is also thinking about starting an Asian CNN, although he admits that for the time being the idea is just a dream. Still, he adds, "What I have dreamed in the past has always become a reality." — Jose Manuel Tesoro

## Wired Top 10

States most visited by unidentified flying objects (in 1995, as recorded by The National UFO Reporting Center)

State	Number of UFOs
1. Washington	218
2. California	141
3. Oregon	59
4. Michigan	31
5. Florida	29
6. Illinois	24
7. Pennsylvania	23
8. Arizona	22
9. Tennessee	21
10. New York	20

Source: 1995 monthly UFO reports collected by The National UFO Reporting Center in Seattle, Washington ([www.nwlink.com/~ufocntr/index.html](http://www.nwlink.com/~ufocntr/index.html)).

— Gareth Branwyn

## ESP: Extra Sony Perception



The Sony Corporation has decided that the most exciting frontier in new technology is inside your head. Under the direction of mathematician Yoichiro Sako, Sony has begun funding a laboratory that specializes in the study of ESP and excitational research — the phenomenon of sending psychic signals. "Sako's main interest is in pushing on the boundaries and definitions that shackle traditional science," says Sony executive Mika Ishida.


What does Sony hope to discover in the new lab? "At this stage in the game it's hard to tell," Ishida says. "There might be a new type of communication system out there, a system that transmits data through mediums we've never before considered. We don't know, but we're trying to find out." — Steven Kotler





Acupuncturists,  
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A person is shown from the side, sitting at a desk. They are leaning forward, with their head buried in their hands, suggesting a state of frustration, exhaustion, or stress. The background is a warm, textured brown. The text is overlaid on the image in a white, sans-serif font.

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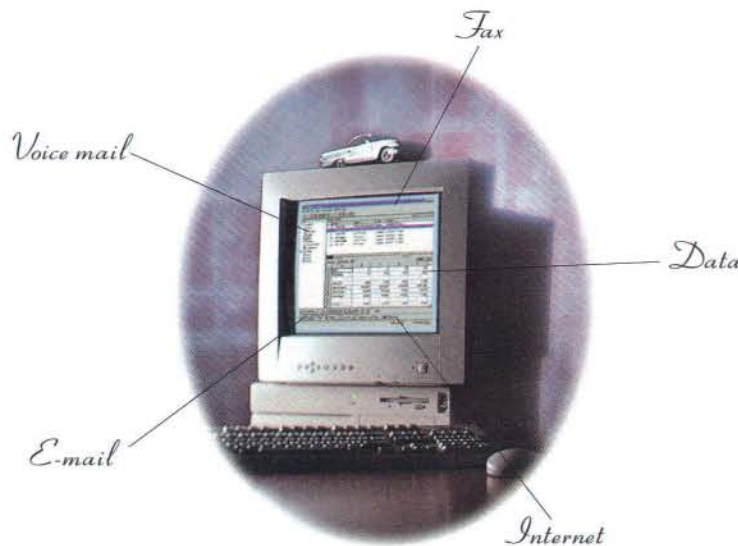


## *Introducing FocalPoint*



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all of your messages, you check a single in-box. You only need to manage one address book, as well. And you can also create a single message, address it to multiple people and the message will be sent out in the preferred



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If you're not too tired.



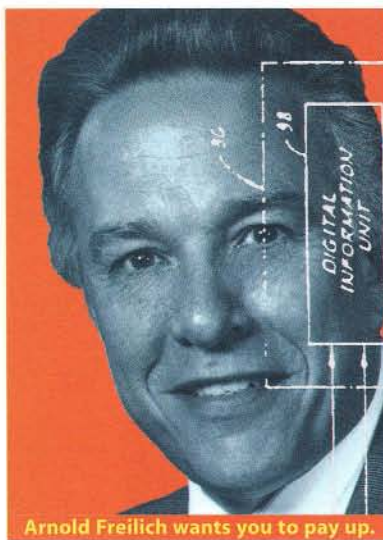
GLOBAL VILLAGE  
COMMUNICATION



# Patently Offensive

**A**mid the great Wall Street feeding frenzy over all things digital, the E-data Corporation is taking a seat at the last supper of capitalist gluttony. It all started with a group of Nasdaq hacks who saw the latent potential in US Patent No. 4,528,643, granted to computer scientist Charles C. Freeny back in 1985. The patent envisions an electronic distribution system that covers any point-of-sale transaction involving the purchase of digital data products, including software, music, fonts, news stories, digital images, and video.

Of course, that covers just about every form of commerce conducted



Arnold Freilich wants you to pay up.

called Interactive Gift Express Inc., and the company still runs Dial-A-Gift, which distributes gift packages

**With US Patent No. 4,528,643 firmly in hand, E-data has finally found its winning ticket.**

over the Internet. Now, having purchased Freeny's patent, E-data is suing 43 companies for patent infringement, including big fish such as CompuServe, Brøderbund, Ziff-Davis, and Waldenbooks.

Freeny's patent prescience has become E-data's winning ticket. Before getting into the patent infringement business, E-data was

of plush toys, bathroom soap, and glazed ham.

"I was asked to look at the patent by a group of investment bankers," recalls Arnold Freilich, president and CEO of E-data. "We then acquired the patent after we obtained con-

trol of E-data. At the time, there was virtually no on-demand electronic distribution system, so I was amazed by the vision expressed in the patent."

Amazed, no doubt, by just how easy it is for a corporation with a lame-duck product to make a mint on someone else's intellectual property. In its latest ploy to persuade "infringers" to start shelling out cash, E-data sent amnesty packages to 75,000 companies. The amnesty program gives companies until August 31, 1996, to buy a license for the E-data patent ... or else. Adobe and IBM have already caved in and paid their dues, which involves sending the company an annual renewal fee plus an "affordable" check based on e-commerce revenue.

"Our files are growing every day, and we continue to watch all areas of the market with vigilance," Freilich asserts. "We will continue to vigorously enforce our patent's claims, but our amnesty gives companies the perfect opportunity to line up for a license instead of a lawyer."

Of course, even without a license, you can still get in on electronic commerce – if you don't mind waiting a while. Mark your calendar: E-data's killer patent expires on January 10, 2003. – Shoshana Berger



Waste not, want not: Steve Loken builds to last.

## Recycling the American Dream



**I**n the houses Steve Loken builds, the concrete is mixed with fly ash and the carpets are made with plastic soda bottles. Loken, the 45-year-old founder of the Center for Resourceful Building Technology in Missoula, Montana, has turned his enthusiasm for recycling materials and waste products into functional homes that don't have a negative environmental impact.

ReCraft 90, Loken's first project, built in 1992, has become something of a tourist attraction in Missoula's Rattlesnake district. But it might be easier on the carpet if you simply visit ReCraft 90 on the Web ([www.montana.com/crbt/](http://www.montana.com/crbt/)). After all, it is Loken's home. "More people can get the idea of what it's all about," he says, "without having to troop through my living room." – Kristy O'Rell



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You've heard the hype.  
We asked the experts.  
Here's the real timetable.

Remember the RadioShack TRS-80? How about the Atari 800 or Texas Instruments TI-99/4A? Those old workhorses from the 1980s PC revolution can easily be found at thrift stores and flea markets for US\$20 or less. While today's microprocessors are certainly much faster, the PC

paradigm hasn't changed significantly since the first home computers sold for only a few hundred dollars. Manufacturers are resting on their laurels while R&D has slowed to a walk. The result? Technological stagnation. *Wired* asked five experts about the future of personal computers.

	The End of the WIMP Interface	The Death of Apple Computer	Personal Computers Get Small	Brain-Computer Interface
Cringely	2025	2000	2010	2300
Nagel	2020	unlikely	2005	unlikely
Negroponte	2002	unlikely	2005	1999
Raskin	unlikely	1985	1999	2015
Weiser	2013	unlikely	1970	now
Bottom Line	2017	unlikely	1998	2122

**Al Cringely**  
"Notes from the Fringe" columnist for *InfoWorld Electric* ([www.infoworld.com/](http://www.infoworld.com/))

**David Nagel**  
president, AT&T Labs; former vice president of research and development at Apple Computer

**Nicholas Negroponte**  
founding director of the MIT Media Lab; Jerome B. Wiesner Professor of Media Arts and Sciences

**Jef Raskin**  
creator of the Macintosh project

**Mark Weiser**  
principal scientist, Xerox PARC

Popularized by Apple and copied by Microsoft, the WIMP computer interface (windows, icons, menus, pointers) was embraced the world over and quickly became the standard for PCs. So what's next? According to Cringely, the so-called desktop metaphor isn't going anywhere because it's a natural hit. "The success of computers is due largely to their adoption by businesses, and businesses use desks. It's hard for typical business types to think any other way." On the other hand, Negroponte thinks that in the next five years most computing "will be through delegation, not direct manipulation." Even if this holds true, several of our experts urge us to keep our mouse chops limber anyway. "Old interfaces never die," Raskin says. "They just become legacy systems."

Apple made history by bringing personal computers into American homes, but many fear that the company will soon be history. Raskin says Apple continues to "evolve" good products, but the company hasn't done anything "earth-shaking" since 1984. "In my ontology," he adds, "you're either revolutionary or sinking." Conversely, Weiser and Negroponte think the company could rise again, perhaps in a different form. "It may have to focus on developing nations and forget its designer roots," Negroponte says. Sarcastically avoiding the question, Nagel thinks Apple will go down around the time "*Wired* gets the Pulitzer." How much for that Pentium again?

According to Dataquest, 16 percent of the mobile computers sold worldwide in 1995 were notebook size or smaller. Cringely believes that number would instantly skyrocket but for two failings: "People would be embarrassed by having too much open desk space, and it's harder to be technically macho around your friends if they can't see what you have." But as Weiser points out, microprocessors have been used for 25 years in a type of mobile computer that remains a huge seller – the calculator. Negroponte forecasts that ubiquitous computing – the development of microprocessors imbedded in the environment to "smarten" your surroundings – will make almost all traditional PCs a thing of the past. "The computer landscape will include PCs more like rare flowers," he says. "We might all have one, but we will have another 1 to 5,000 microprocessors in our lives as well."

Even though researchers have made advances in the area of brain/computer interfaces – like a thought-controlled cursor – a commercially available device for "jacking in" will most likely remain the stuff of cyberpunk novels for the near term. Nagel thinks the concept of digital access to conscious experience "reflects a naïve view of the term *brain* and an unwarranted optimism about technology," but Negroponte points out that progress has been made in the area of "kidney and heart computer interfaces, as well as bionic arms that tap into the human nervous system." To Weiser, though, the most effective brain/computer interface is already here: "It's called language, and it enables us to effectively communicate with other meat computers."

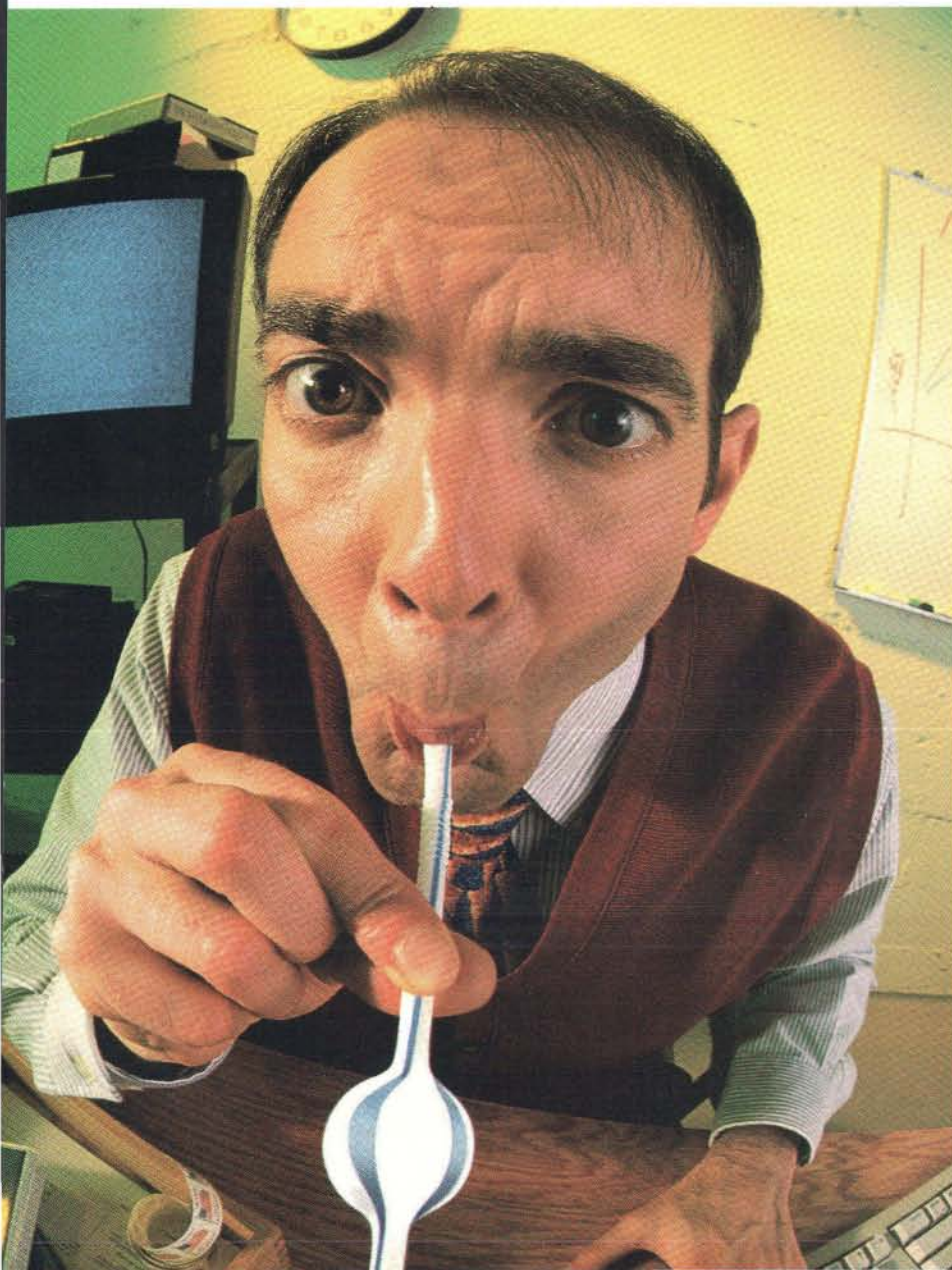


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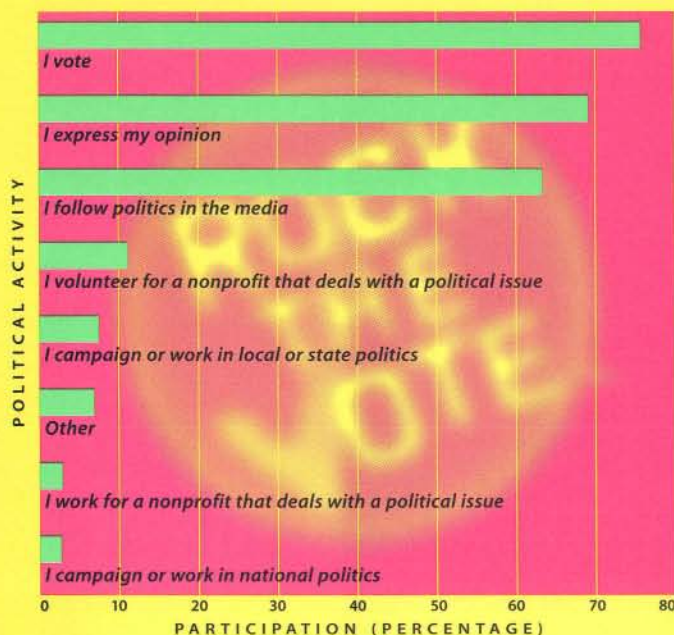
*OfficePoint. The Internet, fax, video marvel that happens to be a phone system.*



## Voting X

Every year, the issue of the Generation X vote gets blown up larger and larger. MTV and Rock the Vote continually rant that Xers won't let themselves be ignored in the political process anymore. Yet what constitutes political activism has apparently changed radically since those far-gone days of Abbie Hoffman. But hey, at least our youth say they're voting.

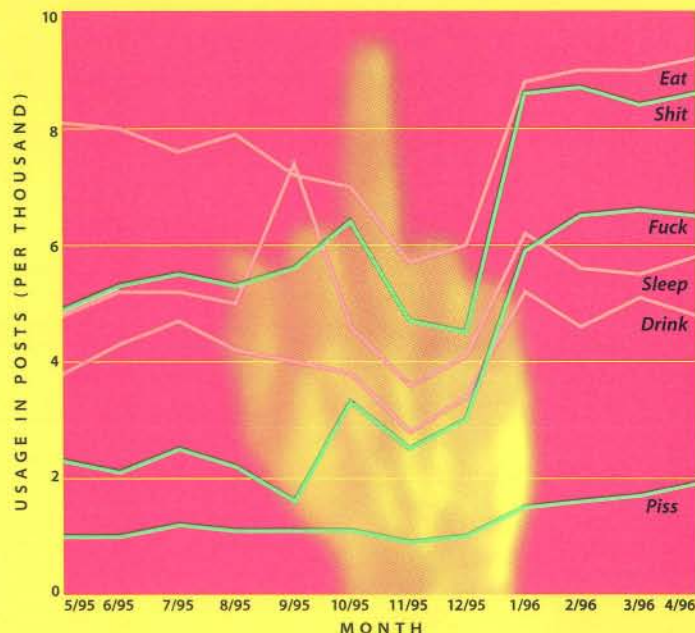
SOURCE: TRIPOD (TRITONE.TRIPOD.COM/)



## Censoring the Net

A quick survey conducted by Deja News, a Usenet search tool, revealed that as the furor over the once ominous Communications Decency Act heated up in the beginning of 1996, so did the language on Usenet. Usage of "vulgar" terms increased up to 60 percent over the "control" terms analyzed in the study. Interestingly, the frequency of *eat* closely mirrors that of *shit*.

SOURCE: DEJANEWS (WWW.DEJANEWS.COM/), MIKE SERFAS (US8563@UIC.EDU)

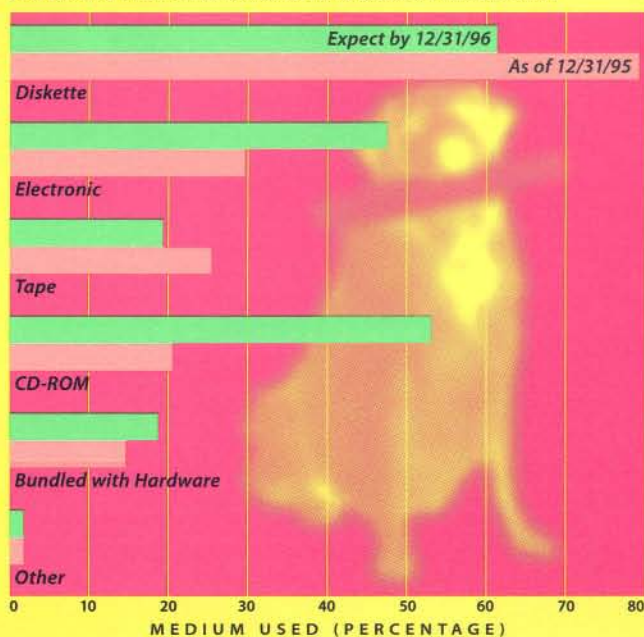


Edited by Tim Barkow

## Distribution Media

Slowly but surely, the floppy is making its way into history books. While CD-ROM has been continually criticized as a poor medium for entertainment, its ability to store and ship data cheaply is unparalleled in today's market. In the next year, the silvery discs should show up more often, and you might find yourself spending more time online, downloading software and updates.

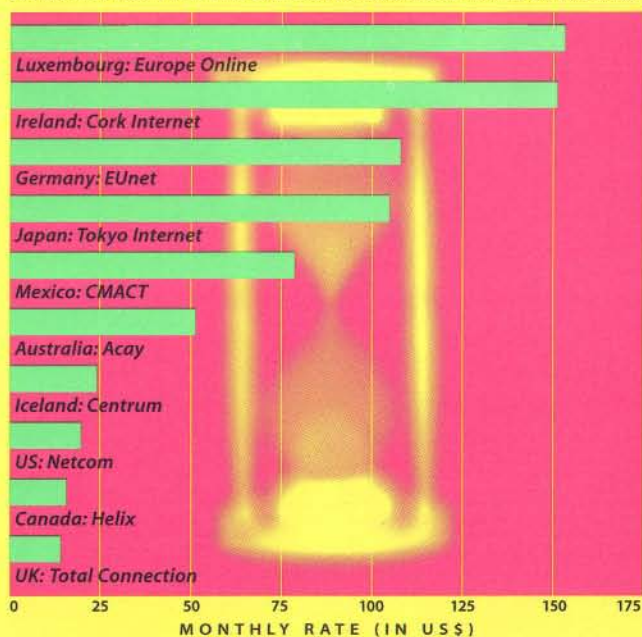
SOURCE: PRICE WATERHOUSE, 1996/97 SOFTWARE BUSINESS PRACTICES SURVEY



## World Dialup Costs

While providing access to the Internet is expected to become a commodity service, the value of that commodity varies widely from country to country. Internet service provider charges for 20 to 30 hours of online time per month reached hundreds of US dollars in some countries, making a \$20 fee for service in the US seem like a better deal than ever before.

SOURCE: ORGANIZATION FOR ECONOMIC COOPERATION & DEVELOPMENT (WWW.OECD.ORG/)







## Trouble locating your files?

### File Management for Windows 95

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Navigator lets you customize your Taskbar to provide instant access to frequently used applications and files.



It also lets you access and manage the files and folders you use most often right from within the application. You can rename, copy, delete and zip files to your heart's content.

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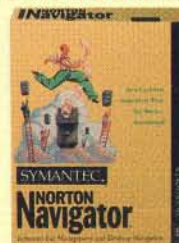
And in the event you've done something you



wish you hadn't, you can undo, unerase, uncopy or unmove multiple previous file operations from anywhere in Windows 95.

So stay organized with Navigator. Because as we all know, a misplaced file or two can bring you a boatload of trouble.

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# The Domain Name System

Let your resolver do the walking.

By Tim Barkow

The tree structure of DNS splits the work between the root name servers and local name servers.



Most folks have been stymied by Netscape's cryptic message that a server can't be located because its DNS entry could not be found. Now, computers speak in numbers, while people, especially in the US, understand only English. What your browser is telling you is that without the DNS entry, it can't translate the English *www.hotwired.com* into the corresponding numerical address 204.62.130.17.

## The hosts file

Back in the Arpanet days, a naming system was devised that would map a computer's IP address (204.62.130.17) to a unique ASCII-based identifier (*www.hotwired.com*).

With only a few computers linked to Arpanet, the US Defense Department's Network Information Center maintained a file named *hosts.txt* – a master list of each computer's address and its host name. Systems administrators would download *hosts.txt* periodically. If you knew an Arpanet computer's name, you would simply look up its IP address in the *hosts* file.

But it soon became clear that the exploding number of hosts was putting too great a load on the NIC computer. Compounding the problem, there was an eruption of small networks of workstations, which get reorganized often and are harder to track. Everyone wanted their computers on Arpanet, but they had to wait for NIC to update *hosts.txt*. Something else was needed. So in late 1987, Paul Mockapetris outlined the Domain Name System.

## A big tree

DNS, as laid out by Mockapetris, is a general-purpose

name service that can be used by Web browsers, email, telnet, and other applications. It's like the White Pages or 411 for computers. But instead of maintaining a single database – which would be impossible today because of the Internet's constant flux and growth – elements of DNS are distributed across thousands of name servers, each of which contains information about one branch of the Internet.

So, if your computer doesn't know where *hotwired.com* is, how can it find a computer that does? By climbing the tree.

The Internet, seen through DNS, resembles a hierarchical tree. At the top are the root name servers, which contain information about the contents of the top-level domains: .net, .com, .edu, .org, .int, .gov, .mil, and the two-letter country codes from ISO-3166 (.us, .uk, .fi, .jp, et cetera). Under each top-level domain, or TLD, the tree structure is basically flat – organizations like HotWired register their second-level domains (the *hotwired* of *hotwired.com*), then any further network structure is up to them. Inside *hotwired.com*, administrators can name computers whatever they want – *hard.hotwired.com*, for instance. Each name reflects its place on the DNS tree: *www.hotwired.com* is a host computer (*www*) in the *hotwired* domain which is inside the .com TLD.

The beauty of DNS is that the work of maintaining an accurate database is divvied up between the root name servers and the local, "authoritative" name servers. The root name servers, if they recognize *hotwired.com*, will point you to *hotwired.com*'s name servers that contain the information on *www.hotwired.com* you seek.

This information is contained in resource records – every host computer with a domain name has at least one. A query response typically contains a computer's host name, its IP address, and the IP addresses of that computer's authoritative name servers.

## Querying the roots

When looking up *www.hotwired.com*, your Web browser sends a message to its authoritative name server, asking it to translate the name into an IP address. Just as every host connected to the Internet is assigned an IP address, it is also assigned a name server by the network administrator (usually a special computer within your company or institution) for finding other IP addresses.

Using a resolver program, the name server sends a message to one of the root name servers, asking it to look in its .com domain database for the IP address of *hotwired.com*'s name server. If the root name server doesn't know, it returns the address of a second root name server, and the resolver asks again. This iterative querying process keeps the querying load off the root name servers, allowing them to give quick answers before moving on to the next query.

Currently there are eight root name servers in the US and one in Sweden that contain pointers to the name servers of all the top-level and most second-level domains. The iterative querying process was built so that no one root name server has to know all of the domains on the Internet. That was, after all, the problem with the old *hosts.txt* system.

This resolver process works well, but DNS also includes two "smart" options to improve

performance. Before contacting the root name servers when it receives a query, a resolver first looks in its local name database to see if the host is part of the resolver's own network. If not, the resolver looks in a cache file of recent query results to see if it can find the host's address there. To keep the cache up to date, each entry is tagged with a time-to-live value, or TTL, usually equal to a few hours or a week. Once the TTL expires, the entry is thrown out.

## Dot whoopie

With the emergence of the Net as a mass market phenomenon, the generic TLDs – .com, .org, and .net – are growing unwieldy. (See "Dueling Domains," *Wired* 4.08, page 64.) For this reason, the Internet Assigning Numbers Authority, the group responsible for managing DNS, has been pushing new domain registrars toward the less used country-code domains. While some don't mind setting up shop in the .us domain, others wonder why they can't set up their own top-level domains. Like .sex, for instance.

They can. The only reason InterNIC holds power over DNS is that all the local name servers in the world are configured to query InterNIC's servers. There's no reason a name server can't query your root name server as well as InterNIC's servers. If enough name servers around the world know to look through your servers when they get a domain name ending in .sex, it would work fine. Truth is, there's nothing in DNS that precludes a little .sex. ■ ■ ■

Tim Barkow (tim@wired.com) is a section editor at *Wired*.



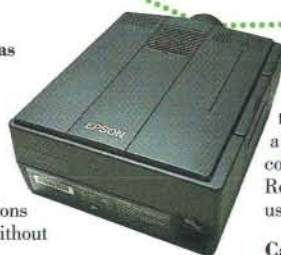
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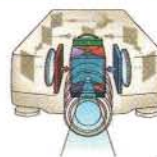
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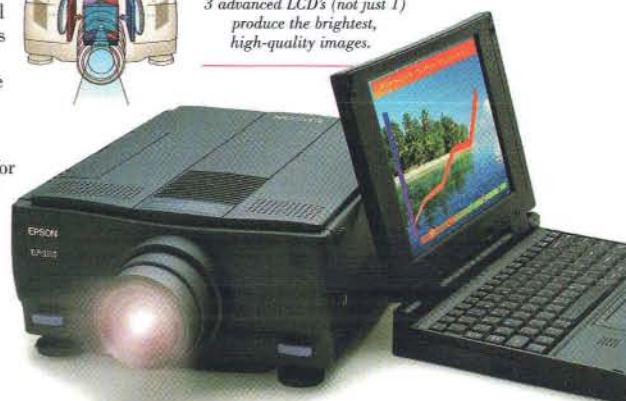
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## Cooling the Net Hype

The mainstream media is drumming hard against the lunacy of investing in Internet stocks. Sure there's a craze on, but for good reason: the Internet really is going to change everything.

By Michael Murphy

And a lot of people are going to make a lot of money in the process.

But that doesn't warrant an across-the-board investment strategy. Although the stocks of bigger high-tech companies are getting a Net boost, the sweetest returns will come from com-

bly high multiples of sales and earnings, even if the companies do well – and most will – shareholders are likely to suffer. Many will post the same market capitalization in 1998 that they have today, even as they double in size. Stay away, even from super-growth companies like Ascend Communications and Cascade Communications.

### Software wary

Let me be blunt: browsers, server software, and search engines will never make money.

user. Don't merely stay away from these stocks – short them.

I'm not as downbeat about companies that make payment system software for Internet commerce. Most of these systems will be integrated with the server software and will support standard credit cards and bank debit or ATM cards. Security First Network Bank, the first FDIC-insured Internet bank, went public in a very successful IPO, doubling the \$20 offering price by the end of the first day. Others will emerge to absorb the above-board Net business demand, and Net-based transactions will become a standard service of every commercial bank rather than a highly profitable specialty.

There is also a substantial market for payment systems that provide anonymity and offshore jurisdictions. Companies selling information over the Internet can call any place home, and the savvy ones are choosing jurisdictions with low or no taxes, financial privacy, governmental stability, and decent communications systems. (Warm water and sandy beaches are also a plus.) Although these stocks are priced too high right now, they are not ridiculously high and remain worth watching.

The companies hawking Web tools have found a new niche for shrink-wrapped software, even if much of it is delivered online. It's cheap and easy to let customers download a trial package and get hooked before they have to pay for it. However, the price points already linger below \$100, and by the time the market is chopped among competitors, profits will be meager. High-end players will do especially badly against the \$99 folks. Steer clear.

As with the browser/server market, Wall Street realizes the opportunity is well under \$100

million for search engines, payment systems, and the rest of the software infrastructure market. But it sees a billion-dollar market by 2000. I say the market won't top \$100 million. Next month's column will be more optimistic and will include some Internet winners.

### TWITS

Although the Nasdaq market has been stormy and tech stocks have taken a beating,

#### Don't Click on Me Internet stocks to avoid

Hardware	
Datacom	Servers
Ascend	Apple
Bay Networks	HP
Cascade	IBM
Cisco	Intel
FORE	NetFRAME
Gandalf	Sequent
Premisys	Silicon Graphics
Shiva	Sun
3Com	Modems
	U.S. Robotics
	Global Village
	Zenith

Software	
Voiceware	Browsers/Servers
VocalTec	Microsoft
Web Tools	Netscape
Adobe	Oracle
DeltaPoint	Quarterdeck
Macromedia	Spyglass
Quarterdeck	Sun
	Document Interchange
	Adobe
	ISOCOR

#### Browse Here E-commerce stocks to watch

CheckFree	Intuit
CyberCash	Security First Network Bank

#### Short 'Em Search engine stocks have no future

Excite	Open Text
Fulcrum	Verity
Lycos	Yahoo!

I remain confident about strong long-term growth in the technology sector. I'm holding stocks in TWIT\$ until market visibility improves. ■ ■ ■

*Michael Murphy is a money manager who publishes the California Technology Stock Letter in Half Moon Bay, California.*

### The Wired Interactive Technology Fund (TWIT\$)

Company	Primary Business	Symbol	Shares	Price July 15	Δ Since June 3	Action
LSI Logic Corporation	Semiconductors	LSI	7,800	19 1/4	- 10 1/4	hold
Applied Materials Inc.	Semiconductor equip.	AMAT	4,000	25 1/4	- 10 1/4	hold
The Walt Disney Company	Entertainment	DIS	1,500	54 1/4	- 5 1/2	hold
Apple Computer Company	Hw/sw	AAPL	4,800	17 1/4	- 7 1/4	hold
Tele-Communications Inc.	Cable television	TCOMA	4,800	14 1/4	- 3 1/4	hold
Intel Corporation	Microchips	INTC	3,000	69 1/4	- 7 1/2	hold
Adobe Systems Inc.	Software	ADBE	5,000	30 1/4	- 6 1/4	hold
Mattson Technology	Semiconductor equip.	MTSN	30,000	9 1/4	- 4	hold
Euphonix	Audio sw	EUPH	17,000	7 1/4	- 2 1/2	hold
Diamond Multimedia	Multimedia hw	DIMD	7,000	7	- 9	hold
<b>Portfolio Value</b>	<b>\$1,333,118.75</b>	<b>(+33.31% overall)</b>			<b>- 25.73%</b>	

Legend: This fund started with US\$1 million on December 1, 1994. We are trading on a monthly basis, so profits and losses will be reflected monthly, with profits reinvested in the fund or in new stocks.

TWITS is a model established by *Wired*, not an officially traded portfolio. Michael Murphy is a professional money manager who may have a personal interest in stocks listed in TWITS or mentioned in this column. *Wired* readers who use this information for investment decisions do so at their own risk.

panies you've never heard of.

Internet stocks break down into five groups: hardware infrastructure, software infrastructure, access providers, content providers, and end-user software. This month, I'll focus on the first two, primarily as groups to avoid.

### A hard line on hardware

The hardware market will reach about US\$1 billion in 1996. That figure is twice as high as many estimates, but I see a vast underrecognized market for corporate intranets and another hidden market in the Far East. The hardware market should double by 1998 and hit \$3 billion by 2000.

This is a real market; hardware manufacturers and datacom providers are selling goods and generating profits. Though with the stocks at such incredi-

The software has to be given away. These companies are competing against computer science students around the world, all of whom have ready access to free distribution channels for their free software.

Internet software will soon be standardized on Unix and NT operating systems. Though Wall Street thinks the tiny \$200 million browser/server market will explode to \$4 billion in 2000, look for the market to implode and vanish. I'd be astounded if it hit even \$500 million by 2000.

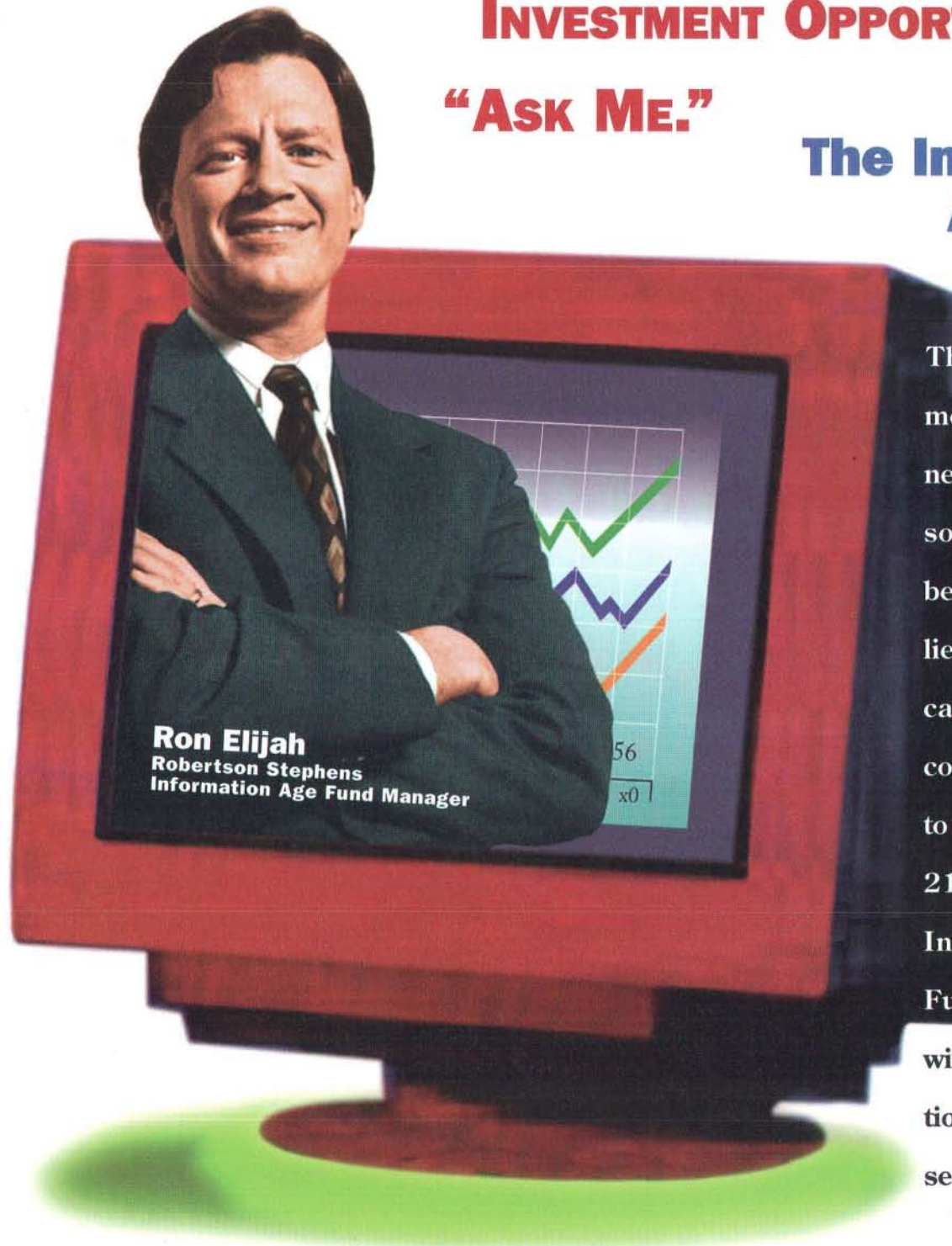
The search engine market is ripe for disaster. These companies have limited histories and uncertain business models. New companies pop up weekly, boasting ever faster, ever cooler, and ever more discriminating searches. But there's no customer loyalty and no way to make money directly off the



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## Cultivating the Netconomy: Looking at the Economy-as-Ecosystem

**T**hese days, business-on-the-Internet conferences are a dime a dozen. Sponsors clamor to sign up the big names for panels on "The Future of Online Services," "Commerce on the Net," and other eye-glazing subjects.

The Bionomics Institute takes a different approach, inviting interesting if relatively unknown speakers first and focusing the topics later. The mind-expanding result brings together economists, policy wonks, venture capitalists, biologists, and high-tech entrepreneurs, all of whom share the belief that technology is changing the fundamental nature of economic life, and that the traditional mechanistic approach to economics is limited – and limiting.

Cued by the '96 theme "Cultivating the Netconomy," thought-provoking speakers such as futurist Paul Saffo, Margaret Wheatley (author of *Management and the New Science*), and Cato Institute president Edward Crane will explore the lessons of biology.

One of the most fascinating presentations will be Robert Axtell

and Joshua Epstein's Sugarscape project. These Brookings Institution researchers have developed a post-Tom Ray modeling environment inhabited by independent agents, each endowed with humanlike rules of behavior governing reproduction, movement, trade, inheritance, combat, cultural interchange, et cetera.

Visit The Bionomics Institute Web site ([www.bionomics.org/](http://www.bionomics.org/)) for your daily dose of "Vitamin B." Here's a taste:

*At Bionomics, one of our mantras is "Simple rules/ Complex behavior." The complex behavior – namely, the rain-forest variety of goods and services a functioning market economy can produce – is easy to see. The simple rules can be a bit more difficult.*

*As institute president Michael Rothschild writes, "It is precisely the lack of simple rules that underlies Yeltsin & Co.'s current economic problems."*

Registration: US\$345 through October 1, \$395 after. Contact: +1 (415) 454 1000, fax +1 (415) 454 7460, on the Web at [www.bionomics.org/](http://www.bionomics.org/).

The Current Roundup (see *Wired* 4.08)

**September 16-20** ISEA96; Rotterdam, The Netherlands. • **September 18-20** Online Developers III; San Francisco. • **September 19-22** Seventh Annual Portland Creative Conference: A Celebration of Film, Television, and New Media; Portland, Oregon. • **September 30-October 1** FireWallCon '96 West; San Jose, California.

**October 16-19** WebNet '96; San Francisco The first World Conference of the Web Society draws webmasters from around the globe to discuss everything from technical R&D to the societal and legal aspects of the Web. Major topics include the Web in 3-D, new server technologies and GUIs, and educational and commercial applications. Registration: around US\$350. Contact: +1 (804) 973 3987, fax +1 (804) 978 7449, email [aace@virginia.edu](mailto:aace@virginia.edu), on the Web at [aace.virginia.edu/aace/conf/calendar.html](http://aace.virginia.edu/aace/conf/calendar.html).

**October 17-27** Art Futura '96; Madrid Less academic than Imagina, more focused on performance art than Ars Electronica, Art Futura is now in its seventh year. This European event explores the artistic facets of the digital realm, focusing on "Robots and Knowledge." Past years have attracted such speakers as Laurie Anderson and William Gibson. Registration: Pta1,500 (US\$20) per day. Contact: +34 (1) 431 0007, fax +34 (1) 577 8330, email [artfutur@ran.es](mailto:artfutur@ran.es), on the Web at [www.ciberteca.es/artfutura\\_96/](http://www.ciberteca.es/artfutura_96/).

**October 18-19** Cultivating the Netconomy: The Fourth Annual Bionomics Conference – Looking at the Economy-as-Ecosystem; San Francisco See information, at left.

**October 20-23** Intelligent Systems: A Semiotic Perspective; Gaithersburg, Maryland This fairly quirky, highly technical conference is a follow-up to the 1995 IEEE Workshop on "Architectures for Semiotic Modeling and Situation Analysis in Large Complex Systems." While most intelligence events focus on neural nets or fuzzy logic, this conference will consider intelligent systems as a whole. A preconference tutorial on applied semiotics will introduce newbies to the topic. The father of fuzzy logic, Lotfi Zadeh, will lecture. Registration: around US\$185. Contact: +1 (301) 975 3881, fax +1 (301) 948 2067, email [lori.phillips@nist.com](mailto:lori.phillips@nist.com).

**October 27-31** Frontiers '96: Sixth Symposium on the Frontiers of Massively Parallel Computation; Annapolis, Maryland You want fast? You got it. This IEEE-sponsored event focuses on the technical issues that define the frontiers of high-performance computing. Workshops on the petaflops challenge and on alternative architectures for specific applications will make your head

OCTOBER 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 NOVEMBER 1 2 3 4 5 6 7 8 9 10

## The Urban Patchwork of San Francisco

In this city of schizophrenic seasons, spring arrives early, and summer late. Forget foliage and apple cider – October in San Francisco means hot days and fogless skies.

Escape the urban asphalt terrain: cross the Golden Gate Bridge and wind along the yellow shoulders of Mount Tamalpais down to the Pacific Ocean. Sit for a spell on Muir Beach or hike up the trail along the

bluffs, then wander over to the Pelican Inn, a British pub meets California bed-and-breakfast, for a pint of ale or a pot of tea.

For a taste of the Pacific Rim head to Yank Sing, a restaurant on the edge of San Francisco's financial district. Here, women bustle round and round with carts of *har gow*, *sui mai*, and other dim sum delights.

Thousands of Asian immigrants arrive on these shores every year,

bringing new patterns to the patchwork culture of the city. But the spirit of Latin America is equally strong. Take an afternoon tour of the local Diego Rivera murals – at The City Club of San Francisco downtown, the San Francisco Art Institute in North Beach, and across the bay at UC Berkeley's Stern Hall.

Or feast your eyes on the street talent that decorates Clarion Alley, a narrow passage running between Valencia and Mission streets. Combine these visuals with a picante feast at El Toro Taqueria. Forget Rice-A-Roni, burritos are the real San Francisco treat. – Jessie Scanlon

spin. Registration: unavailable at press time. Contact: +1 (202) 371 1013, fax +1 (202) 728 0884, email [frontiers96@cesdis.gsfc.nasa.gov](mailto:frontiers96@cesdis.gsfc.nasa.gov), on the Web at [cesdis.gsfc.nasa.gov/front96.html](http://cesdis.gsfc.nasa.gov/front96.html).

**November 7-8** Doors of Perception 4 'Speed'; Amsterdam Modern culture worships speed above all else. But what is the price of this fast, faster, fastest religion? As this Netherlands Design Institute conference asks, Is it time to build "selective slowness" into our lives? Ultimately, what are global networks and multimedia for? Speakers such as computer engineer Danny Hillis and architect Rem Koolhaas discuss these issues and more. Registration: Dfl700 (US\$420), Dfl350 (US\$210) for students. Contact: +31 (20) 428 2822, fax +31 (20) 420 4807, email [kietsch@xs4all.nl](mailto:kietsch@xs4all.nl), on the Web at [www.designinst.nl/](http://www.designinst.nl/).

**Out on the Range:**

**November 7-8** CyberRisk '96; Arlington, Virginia. Contact: +1 (717) 258 1816, fax +1 (717) 243 8642, email [info@ncsa.com](mailto:info@ncsa.com), on the Web at [www.ncsa.com/](http://www.ncsa.com/). • **November 17-22** Supercomputing '96; Pittsburgh, Pennsylvania. Contact: (800) 472 5989, +1 (412) 268 8792, on the Web at [www.supercomp.org/sc96/](http://www.supercomp.org/sc96/). • **November 18** GreyWorks '96; College Park, Maryland. Contact: phone/fax +31 (20) 671 1818, email [greyenet@inter.nl.net](mailto:greyenet@inter.nl.net).

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## Still Not Free

In 1995, Steve Brown's one-line BBS was shut down by Simon Leis, the smut-busting sheriff of Cincinnati, Ohio. The crime: pandering obscenity — involving material much of which Brown believes was uploaded by a BBS user. He'll never know for sure, however. Police confiscated his computer.

Since Brown lacked the resources to fight the case, he entered a no contest plea and was placed on probation for three years. Due to the nature of the charge, his daughter was interviewed by inquisitors from the city's child welfare department; Brown must undergo psychiatric counseling. He has lost US\$5,000 in hardware, as well as his good name, and to date, he still hasn't seen most of the offending material in question.

[ORIGINAL STORY IN WIRED 4.04, PAGE 82.]

# Return of the Pirates

In the early 1990s, video piracy was draining the industry of US\$500 million a year. All across the United States, legitimate dealers sold illegally modified descrambling units to heartland Americans who wanted to watch satellite TV but resented paying fees charged by companies such as HBO.

The scam fizzled in 1995 when pirates failed to crack General Instrument's VC II Plus encryption scheme. RCA's new Direct Broadcasting System soon offered a tempting target. Hackers finally cracked the system late in 1995, and now video piracy is booming again.

The DBS configuration uses a pizza-sized receiving antenna and a set-top decoder box that must be activated by a plug-in smartcard. The card, however, becomes obsolete after a limited period; providers automatically send legal consumers a new one, which they must use if they want to keep their systems operable. Hackers provide an alternative: consumers who want access to all 200 channels at no extra expense can go to their friendly neighborhood dealers and purchase illicit cards. The cards come from satellite pirates, who also supply card-programming hardware that plugs into the parallel port on a dealer's PC clone.

At least four kinds of pirate cards are now in circulation. "The hack has run wild," said one informed source: he estimates that there are probably 30,000 illicit cards already in circulation.

Electronic countermeasures — special codes embedded in TV signals that make set-top boxes reject the pirate cards — have already been used. The pirates have regrouped and parried, distributing workarounds that allow dealers to reprogram the illicit cards and get them running again. It's a game of hack and counterhack that looks as though it will keep cycling for a long, long time.

Kingpin pirate Ron MacDonald claims he's now out of the loop. "We rode the wave as high and long as we

could," he said during a recent telephone interview from his haven outside the United States. "And we figured it was time to back off and let somebody else take over." MacDonald now runs a legitimate telecommunications business that he doesn't want associated with his pirate past.

Canada and the Caribbean offer fertile business opportunities to satellite hackers, as their copyright laws prohibit reception of US television: you can't legally subscribe to DBS even if you want to. Surprisingly, Thomson Electronics is selling decoders to Canadian dealers even though a memo from the company admits that "programming available in the United States may not be authorized for reception in Canada." In other words, sure, you can buy the hardware legally, but if you can't use it without violating copyright law, well, that's your problem.

The scenario is a déjà vu of the early 1990s, when General Instrument sold more than a million set-top decoders, feeding a demand that was partly created by video pirates. At that time, many industry observers noted that signal piracy is one of the best things that can happen to a decoder manufacturer.

To learn more, visit these Web sites: [www.spots.ab.ca/~deejay/dss.html](http://www.spots.ab.ca/~deejay/dss.html); [www.scramblingnews.com/](http://www.scramblingnews.com/); [www.dtronix.com:80/~dsf/](http://www.dtronix.com:80/~dsf/). — Charles Platt

[ORIGINAL STORY IN WIRED 2.08, PAGE 76.]



## Heads or Tails?

Key execs have scattered. The company has suffered multiple incarnations. And Atari Corp., half of the splintered Atari empire, is merging with JTS, a maker of hard drives. Yet Nolan Bushnell, a member of Atari's old guard, is again a contender. Having recently joined Ariston International to head its strategic planning division and lead the company into Internet gaming, Bushnell is returning to the game industry 20 years after he slid that first quarter into the inaugural game of *Pong*. Indeed, another member of Atari's ranks has landed on his feet: Ted Hoff bailed out of the sagging Atari Corp. earlier this year to take a position of senior VP of marketing and sales at Sega.

Seeing a window in the chaos, Bushnell plans to give Atari Corp. a healthy run for its money. "Right now I see an opportunity for some of the little guys to become major players, and I intend to be one of them."

[ORIGINAL STORY IN WIRED 1.6, PAGE 73.]



## Real or Illusion?

Crazed fans wanting to core-punch the ILM compound and its fantastical worlds won't have to elude security anymore. Jurassic Park — The Ride swung open its wooden gates on June 21. The sprawling, prehistoric habitat swallowed more than US\$100 million and six acres of the Universal Studios Hollywood lot before it finally came to life. Universal, which began developing the enclosure more than three years before

*Jurassic Park* was released in theaters, says this is the most technically advanced interactive ride in history.

"The park dinosaurs move faster, more fluidly, and more realistically than any animated creature ever built," claims Neil Engel, the ride's producer. Paleontologists and scientists from Sarcos, a major defense contractor that builds space shuttle components, developed a new animatronic methodology that employs up-to-

the-second tech with principles of hydraulic physics, allowing the dinos to seem alive. Some can attack riders at speeds of up to 25 feet per second.

"Putting yourself into the movie is pretty wild," says Steve Gawley, ILM's chief model-maker. "Not everyone can handle it. People are just wanting more and more." The ride, which includes an 84-foot drop at 50 mph, is ready to comply.

[ORIGINAL STORY IN WIRED 1.4, PAGE 72.]



# Carry more useful information around on your wrist than most people carry around in their heads.

There is a category of information that cannot be trusted to the average human brain: meeting times, birthdays, phone numbers, and, of course, the notorious wedding anniversary.

Fortunately, for those of you who share this particular cranial shortcoming, help is available.

The original Timex Data Link™ watch is a phone book, a personal calendar, a day planner and an alarm clock. The new 150 model (at right) offers even more than that.

But what's remarkable about these watches isn't so much the data they hold, but how they acquire that data—namely, straight from your computer screen.

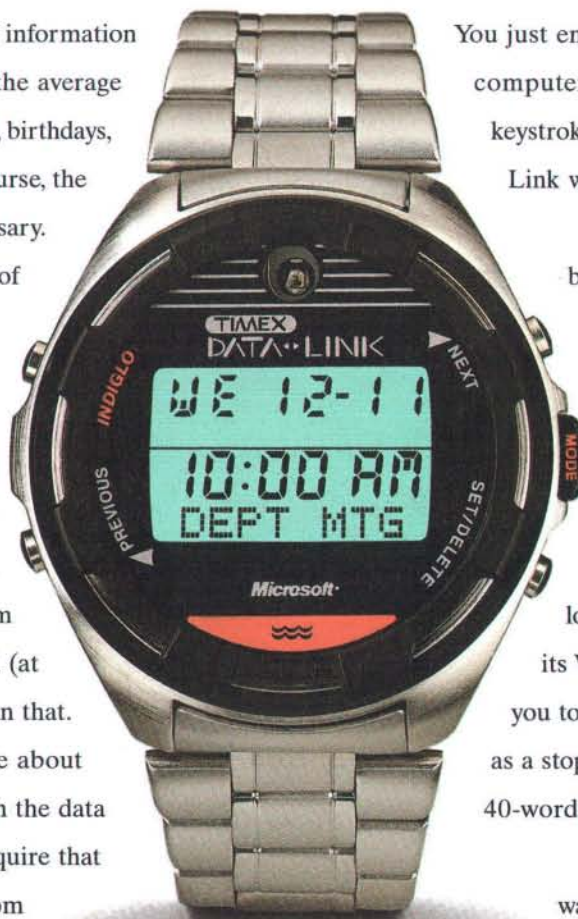
Both models come with their own Microsoft Windows®-compatible software, or there's a direct link with Microsoft Schedule+ for Windows 95.

You just enter your information into a computer, make another couple of keystrokes, and hold the Timex Data Link watch up to your monitor.

That's it. The little auxiliary brain on your wrist is now activated. The original, hugely popular Timex Data Link model will store up to 70 different entries. The new 150 is even more clever: it stores up to 150 entries, downloading speed is doubled, and its WristApps™ software allows you to download capabilities such as a stopwatch, countdown timer or 40-word note feature.

With the Timex Data Link watch, all that important information is now right there on

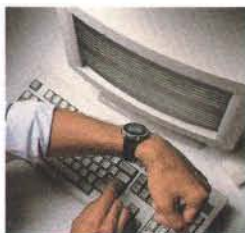
your wrist, safely stored in a memory system more reliable than your own. Not that that's saying much.



*The new Timex Data Link 150 model.*



*Enter your personal information and schedule, using the supplied Timex Data Link software.*



*The Timex Data Link watch reads the information right from your computer screen.*



*All that important information is now on your wrist, as portable as the arm you wear it on.*



# Dancing in the Streets

Why the Philly CDA decision *really* matters.

## Adrift on Planet Janet

Attorney General Janet Reno has joined the chorus of hucksters trying to pawn off the Clinton administration's key escrow proposals. Speaking in mid-June in San Francisco, Reno regurgitated the White House party line that crypto is "a new and powerful tool for criminals" that can "frustrate completely" the government's ability to conduct electronic surveillance. The solution? More government, of course. Top Cop Reno announced plans to create a new bureaucracy to regulate the use of crypto technology.

## Leahy versus Landers

A minor flame war has erupted between Senator Patrick Leahy (D-Vermont) and advice columnist Ann Landers. After reading a recent Ann Landers column about spouses whose partners left them for people they met on the Net, Leahy wrote in to counter the net.fearmongering. Landers admitted that most Net users are "fairly decent people," but she insisted "the Internet is tailor-made for con men, the lonely, and the bored." Wake up, Miss Ann. The same could be said about bars, telephones, and bingo parlors.

## Hatchet Job

Even as we celebrate the CDA decision, Senator Orrin Hatch (R-Utah) is cooking up new censorship legislation. In June, he held hearings in support of S 1237, The Child Pornography Prevention Act of 1995, which he has sponsored. Designed to broaden the definition of child pornography, Hatch's bill would give prison terms of up to 15 years to anyone who views or distributes any depiction of a minor engaged in sexually explicit conduct – even if the depiction is a completely fictional drawing, painting, or computer-generated image. As an added bonus, Hatch's bill would also expand search-and-seizure rules relating to child pornography and exploitation cases.

Sure, we netizens celebrated for a day or two in June after the three-judge Federal panel in Philadelphia found the Communications Decency Act

## By Mike Godwin

unconstitutional. There were fireworks on the Web, rallies in several cities, and plenty of joyful statements to the press. The most memorable quote came from EPIC director Marc Rotenberg, who called our victory "the *Times v. Sullivan* of cyberspace."

Rotenberg, like me, is a co-counsel on the case. But I couldn't quite follow his reasoning. After all, the Supreme Court's 1964 decision in *Times v. Sullivan*, a libel case, renovated the whole edifice of First Amendment law. Even at the time, it was recognized as such a clear victory for free speech that constitutional theorist Alexander Meiklejohn, then 92, told one fellow scholar that the decision was "an occasion for dancing in the streets."

No way we've got a *Times v. Sullivan* here, I figured. All we have is a win in one federal district. Down the road, the Supreme Court can reverse any constitutional or legal finding in our case. The justices could also uphold our decision on narrower constitutional grounds, giving an approving nod to the censorship-happy yahoos who infest Congress.

But then I went back and reread the section of the decision that deals with findings of fact ([www.aclu.org/court/cdade.html](http://www.aclu.org/court/cdade.html)). All of a sudden, my assessment of the court's decision shifted from measured gratitude to pure awe.

Although two of the three judges on the panel were *appeals* judges, the panel's actual role in this case was that of a *trial* court. Playing that role means

building the record of facts about the Internet that the Supreme Court will rely upon as it reviews the case.

The findings of fact in our case are stellar. The judges fully grasped the First Amendment-protected roles the Net plays in our society: as newspaper, library, post office, public forum, theater, and home turf for countless virtual communities. They also recognized that the Net is an utterly decentralized, global grassroots phenomenon – which means that top-down censorship efforts like the CDA will succeed only in chilling protected speech. They won't do a thing to stop true law-breakers.

It's the *finding of fact* in this case that gives the decision real muscle. Here's why:

**New respect for new media:** The court's findings of fact mark the first time a US court has fully measured the social significance of a new medium so early in that medium's existence. From these facts, the judges concluded that the Net deserves the highest degree of constitutional protection – quite a departure from our legal system's historic assumption that new media deserve less protection, or none at all.

**Circumscribing the Supremes:** The findings are solid and comprehensive enough to inhibit any Supreme Court inclination to overrule the Philadelphia court on factual grounds. The Philly judges got the facts right, and those facts are universal in their applicability to the Net. In addition, overruling the lower court's findings of fact would require a degree of jurisprudential hubris that the Supremes detest when other appellate courts demonstrate it. There's little chance that the justices will resort to such second-

guessing in our case.

**Corralling Congress:** The findings also cast doubt upon any congressional effort to craft a constitutional "Son of CDA" by tinkering with the CDA's original language. The CDA was built on the assumption that the Net functions just like TV or even dial-a-porn services – an assumption that lies dead and buried in Philadelphia. Now, even the most tech-ignorant legislator can learn from a single court document how and why the Net should enjoy full constitutional protection.

**The ripple effect:** The findings in themselves are enough to make *ACLU v. Reno* a leading case – maybe even the leading case – for a full range of burning net.law issues. Cyber lawyers everywhere are already scrambling to determine how this case's factual framework will shape future cases involving encryption, anonymity, privacy, and copyright reform.

The more I look at the decision, the more I'm in awe of it. Even if the court's legal conclusions in this case are overruled, narrowed, or just plain ignored, the judges' mastery of the facts has already changed everything. And in the end, neither the Supreme Court nor Congress will be able to undo this transformation. That thought took me back more than three decades, to the era of *Times v. Sullivan* and a certain Motown hit. Marc Rotenberg had it right after all.

So for today, we shouldn't worry about the Supremes – it's time to crank up the Vandelas. Get off your feet and take to the streets. We won a lasting victory in Philadelphia. We should be dancing. ■ ■ ■

Mike Godwin ([mnemonic@well.com](mailto:mnemonic@well.com)) is staff counsel for EFF.





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# Web Brownout



**Why the hell is the Web so slow?**

**What exactly is causing the problems?**

**And how are we ever going to fix them?**

**(Chill out and read on. It's going to be OK.)**

**By Simson Garfinkel**

**O**n November 9, 1965, the Great Northeast Blackout left 30 million people in the United States in darkness. It started as an unexpected power surge through the relatively new regional electric grid, but soon cities across the region were going dark as power plants in New York, Connecticut, Massachusetts,

Vermont, New Hampshire, and Maine tumbled like dominos.

Over the coming six to twelve months, computer users around the planet are likely to experience the Internet equivalent of the Great Blackout, or at least frequent brownouts, as our information infrastructure staggers and struggles under the heavy onslaught of new users and new demands.

These slowdowns will be more than just a minor annoyance: they will challenge the very future of the network. Businesses that depend on the Internet

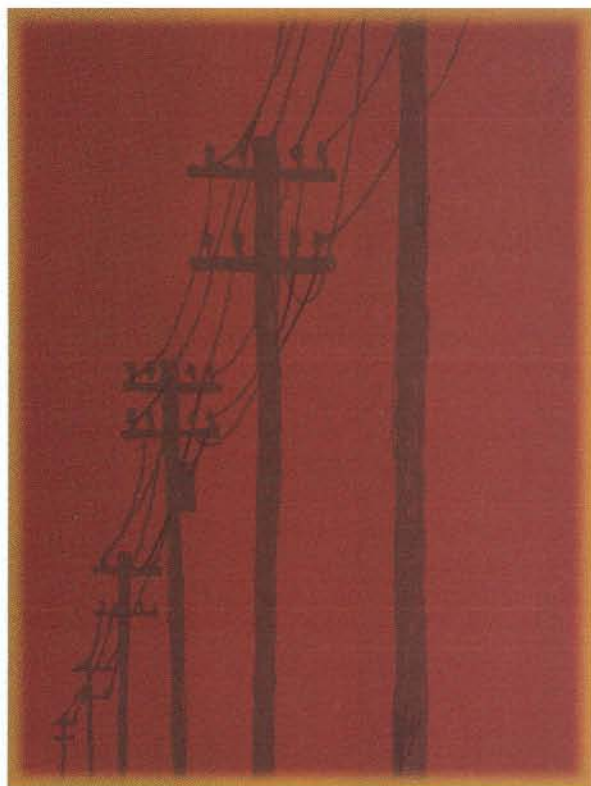
of service for the industry by calling for more careful operating procedures and more investment in interconnections between regional power companies. The influential report concluded: "The utility industry must strive not merely for good, but for virtually perfect service." And not many years later, we got it.

Today, we're watching not the end of the information network, but the beginning. "There will be a collapse, then operations will resume. There will be another collapse, and operations will resume," says Bob Metcalfe, inventor of the Ethernet network technology, and one of the loudest voices proclaiming the coming doom. After each collapse, Metcalfe says, people will try to figure out what happened, then fix the network so that it won't happen again. Eventually, he predicts, a new industrial-strength Internet will emerge that will be solid and reliable, and will be different from today's Internet in one very important respect: people will pay for what they use.

It's easy to spot the symptoms of Internet slowdown: Web pages crawl onto your screen, images drip-drip-drip into existence. But diagnosing the problem can be far more complex – as complex as the network's topology itself. Slowdowns fall into two broad categories: delays caused by the network, and delays caused by network servers. There is no single organization to blame, because everybody's system needs improvement. Fortunately, all of the problems are solvable.

The typical act of viewing a Web page involves sending at least a dozen packets of information over at least five separate networks: 1) From your computer, over your modem and phone line, to your Internet service provider. 2) From your ISP to one of the national backbone providers – usually MCI, BBN, or Sprint. 3) From the backbone provider through one of the national peering locations to another backbone provider. 4) From the second backbone provider to the Web site's ISP. 5) From the Web site's ISP to the Web server itself. And then, of course, the whole process has to run in reverse across the same five networks. Repeatedly.

A fault in any of these paths can lead to a slowdown or an outright info blackout. That's because



**The Great Blackout of '65 forced the electric power industry to provide virtually perfect service. Will chronic Web slowdown lead to an industrial-strength Internet?**

will find themselves cut off from their branch offices, their suppliers, and their customers. Web sites that charge by the hit for advertising will see themselves short of funds, since network congestion will keep people away. And press reports of the slowdowns will keep new users away, further confounding business models that depend on the Internet's continued growth.

Fear not: We fixed the power grid after 1965, and we'll fix the information grid, too. Back then, the Great Blackout sent consumers, businesses, government officials, and the media into a panic. Some predicted doom from a society and technology that was growing too complex. A month later, the Federal Power Commission issued a report that raised the standards



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even though people claim that the Internet was designed to withstand an atomic blast, today's Net isn't being run that way. While the nation's big network providers mostly have redundant paths between their own locations around the nation, the links between your modem and the backbone aren't redundant. Neither are the links between the backbones and many commercial Web sites.

Like the power industry in 1965, the nation's Internet providers are now scrambling to make the network more dependable. (An increasing number of sites, for example, are installing second

see better performance by turning off your modem's error correction. That's because the Internet Protocol is better at dealing with line noise than the modem protocols are. IP will retransmit packets that are lost or arrive damaged, but your modem will keep trying to send the garbled data again and again, until it finally succeeds or hangs up the phone out of frustration.

On the other side of the telephone line is another modem – one of many stacked up at your ISP. In all likelihood, that modem is connected to a box called a terminal concentrator, which takes the data you sent and puts it on an Ethernet local

their customers. Thus providers want to install very fast backbones so customers won't see delays, but they don't want to install too many because that expense eats into the bottom line.

What complicates the equation even more is today's widespread practice of flat-rate pricing – charging a single monthly fee for a Net connection, be it a dialup modem or a T1. With flat-rate pricing, the network provider does not want the customer to use the connection, because any use increases the demand on the provider's backbone. That's backward, says Metcalfe. "If you are a network supplier, you should benefit from your customers using the network, not say, 'Gee, I hope they don't use it too much.'"

Flat-rate pricing, at least for T1 connections, may be getting phased out. Already some providers, such as BBN and Alternet, have discovered that they can lower prices for many T1 customers who are relatively light users by raising the prices for customers who are heavy users. The result: metered T1 connections.

Fortunately, the Internet's backbone providers aren't simply waiting for the economics to be fixed: they are busy installing new equipment and adding capacity to keep up with anticipated demand. This task is substantially complicated by the 90 to 120 days it can take to order the necessary hardware, wait for its delivery, lay the fiber, and arrange for the complex configuration that high-speed connections require.

Consider MCI, which dramatically improved the speed of its backbone in the spring of 1996 by installing high-speed ATM switches and connecting them together with OC-3 links delivered by fiber optics. Each optical-carrier link moves data at speeds of 155 Mbps between the company's switches – the equivalent of more than 100 T1s. That's fast enough to let more than 5,000 people simultaneously download Netscape's homepage at the top speed of their 28.8 modem.

But OC-3 is just the beginning. Simply by changing a card in the ATM switch, MCI can quadruple the speed of the circuits, moving them from OC-3 to OC-12. "We have plans to upgrade to OC-12s this

## At any given time, the companies developing the hardware and software running the Net are keeping just six to twelve months ahead of the curve.

links to insure a reliable Web presence.) But that push is being complicated by tremendous growth in almost all uses of the Net. At any given time, the companies developing the hardware and software running the Net are about six to twelve months ahead of the curve. In other words, today's top-of-the-line Internet routers, data circuits, and servers won't be up to the task of satisfying network traffic demands in six to twelve months. Fortunately, by then a new generation of hardware and software will have been released – a generation that itself will be obsolete in *another* six to twelve months.

### Modem malaise

The first clue of impending network logjams usually comes when you click on a link – and the Web page takes three minutes to download. What's wrong?

The problem could be your modem. You can't slurp pages off the Internet faster than the speed of your connection. To make matters worse, many modems are configured so that they run even slower than needed – though how to solve this is a subject of great debate. Most modems are equipped with circuitry that automatically corrects data transmission errors as they occur. But if your computer is connected to noisy telephone lines, you may

area network. From there, the data probably travels to a router, down a high-speed line, and ends up on a national backbone.

Until your packets reach the backbone, they are vulnerable. Turn off one of the modems, break the Ethernet connection, or crash one of the routers, and your link to the Net disappears. Until you reach the backbone, there's almost no redundancy.

### Backbone bottleneck

The Internet's various backbones can cause their own bottlenecks and delays. Almost always, these delays are caused by too many people trying to send data down the same link at the same time.

Unlike the phone system, which reserves channels end to end for every active phone call, the long-haul links of the Internet are shared moment to moment by all of the packets that are trying to cross them at that time. When the links get filled up, users don't get busy signals as they do on telephone lines. Instead, they get increasingly poor performance. Dropped packets. Delayed responses. Data death.

But keeping data flowing smoothly requires that Internet providers walk an economic tightrope. That's because it costs providers substantial amounts of money to increase their network capacity, but these costs can't be billed directly to



year," says Rob Hagens, MCI's director of Internet engineering.

Even now, information flows relatively well along the backbones. "Within the individual networks, we see very few problems," says John Curran, chief technical officer at BBN Planet. But all is not roses. That's because there is more than one company with an Internet backbone, and, as Curran points out, "right now the Internet is being stressed at the interconnection points."

### Malfunctioning MAEs

The Internet's biggest problems today are at the MAEs – the metropolitan area exchanges where the country's big Internet providers trade packets with one another. Imagine a nation of six-lane highways that all converge on a few clogged cloverleafs. That's the MAEs. Two of the largest and best-known of these are MAE East, in North Virginia, and MAE West, in the San Francisco Bay area.

The solution? Build more capacity, and build it smarter. To build more, MFS Communications Company, the organization that runs the MAEs, has been installing its own high-speed ATM networks that can handle significantly more traffic. To build smarter, MCI, Sprint, and BBN are establishing "private peering" locations, where two companies will interconnect their networks and evenly split the costs of doing so. Private peering "should pull

### Roundabout routing

Every packet that travels the Internet is labeled with its final destination, but not with the route that the packet needs to take. If a link between two parts of the network is damaged – for example, if a long distance circuit is accidentally cut by a utility crew – the network is supposed to automatically route the packets around the point of failure. To accomplish this feat, routers on network backbones need to have a complete map of the network's current structure. The map lets the routers decide where to send each packet on a packet-by-packet basis.

The size of routing maps has been growing steadily ever since the Internet's birth. Three years ago, the gurus on the Internet Engineering Task Force worried that routing tables were growing too fast – in particular, they were doubling in size every nine to ten months, whereas the density of RAM chips inside the routers, the chips that hold the routing tables, was doubling only every 11 to 24 months. If nothing was fixed, then at some point the routing tables would become too large to fit in the routers, and the network would melt down.

Fortunately, something *was* fixed. The solution was to change the way the maps are stored in the routers and transmitted around the network. Engineers developed a new system called CIDR (classless inter-domain routing), which allowed individ-

## The backbones hold up relatively well, but right now the Net is being stressed at the interconnection points.

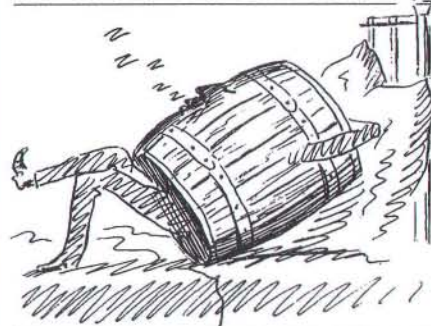
a significant amount of traffic out of these exchange points and leave more bandwidth available for everyone else," says Benham Malcom, manager of SprintLink engineering.

Of course, private links like this complicate the overall structure of the Internet. Computers at both ends need to know if the direct link is up or down, so they can decide whether to send packets across the link or to the public exchange. Making that decision is the quintessential problem of routing. And it's a problem that's getting harder and harder to solve every day.

ual networks on the Internet to be automatically aggregated into larger networks. The immediate result was smaller routing tables. The long-range payoff was routing tables that grow at a slower rate. Once again, the imminent meltdown of the Internet was pushed a few years further into the future.

One problem that remains is route flapping. Every time a route on the Internet gets turned on or cut off, that information has to be sent to hundreds or thousands of other routers. When routes go up and down repeatedly, they are said

## IT SLEEPS ALONE



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## ELECTROSPHERE

to "flap." A flap can happen because a router is rebooting, or because a long-haul link between two routers starts generating errors, or because a router is improperly configured.

Most route flaps are harmless, affecting only a few customers. Sometimes, though, flaps can trigger long-dormant bugs in the routers' computer programs, causing widespread failure. (In 1980, for example, the Arpanet collapsed because of such a bug - each router crashed, but only after it sent out packets to neighboring routers telling them to do the same thing.) Flaps can dramatically change traffic patterns

the MAEs aren't overloaded, then eventually the packets end up at the destination Web site. Here's the final place where connections can bog - or break - down. At the server.

If there's a Web site that is ready for the massive loads that many will see in the future, it's Netscape's. Right now the Netscape site is getting 80 million hits a day. Thanks to the millions of users who have left *home.netscape.com/* as their browser's default homepage, and the people who frequently click Navigator's Net Search, Netscape's Web site has become the busiest site of all.

**If there's a Web site that is ready for the massive loads that many will see in the future, it's Netscape's - with 80 million hits a day.**

on the Net, causing moments of congestion followed by periods of relative calm. To the untrained observer, the Internet seems to suddenly stop working, start working again a few minutes later, then stop working again.

Right now, Internet providers don't seem to have a technical solution to stop route flapping. That's because the information that a link has gone up or down has to be carried to other routers on the network so they can route around the failure. Instead, Cisco Systems Inc., which manufactures the lion's share of routers that run the Internet's backbones, recently added an anti-flapping feature to its router software to deal with organizations that are flapping their routes too much. Anti-flapping software lets the backbone routers detect when a connected network is flapping its routes. The backbone router can then drop any packets that are destined for the "problem" network for about half an hour. Think of it as a form of electronic time-out.

Robert Andrews, director of the Netscape site, can almost literally watch the world turn through his Silicon Graphics Challenge server. The Challenge crunches the log files from the 50 computers that make up Netscape's presence on the Internet. As the business day starts in Japan, then Europe, then New York, Chicago, and San Francisco, there are a series of surges on Netscape's site as millions of office workers sit down at their computers and start their browsers. A million hits here, a million hits there. The screen shows the pulse of the global network.

To satisfy these huge demands requires three things: a connection that is fast enough to pump out the data, computers that are fast enough to keep up with the demand, and memory that is large enough to support thousands of simultaneous connections.

Building the connection to the outside world is relatively easy: Andrews has arranged for three fiber-optic T3 connections, each capable of sending data at 45 Mbps. One goes out the front of the building to Sprint, while the other two go out the back of the building to MCI. The geographical diversity assures that if one line is accidentally severed, the others will in all likelihood continue operating and carry the load. At Netscape's headquarters in

### Swamped sites

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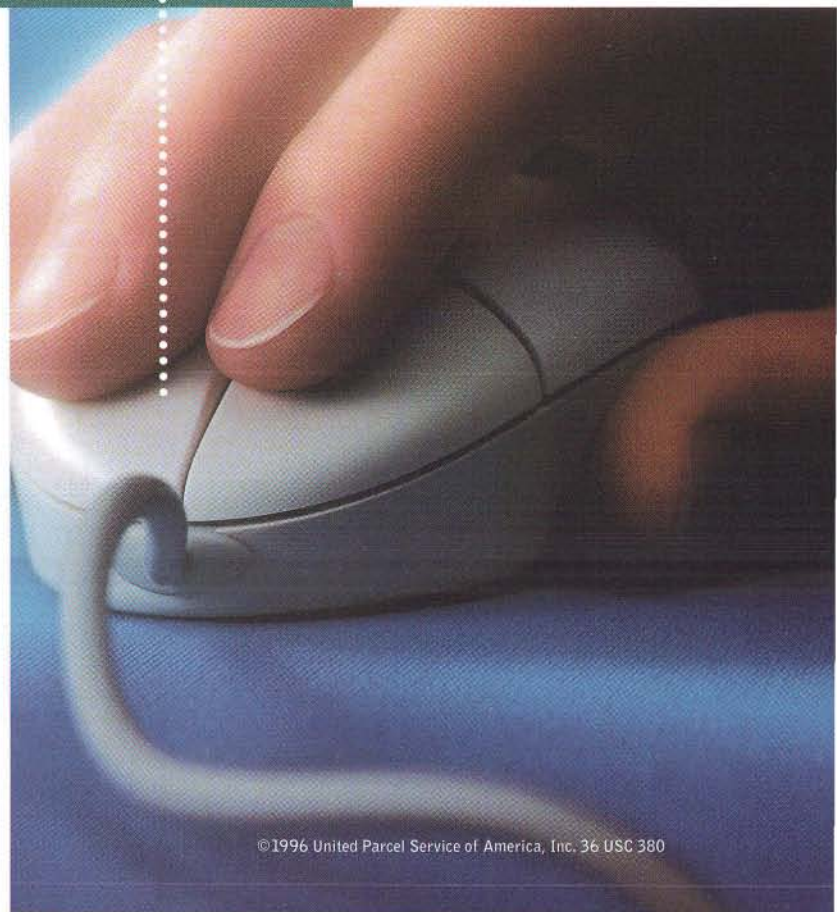
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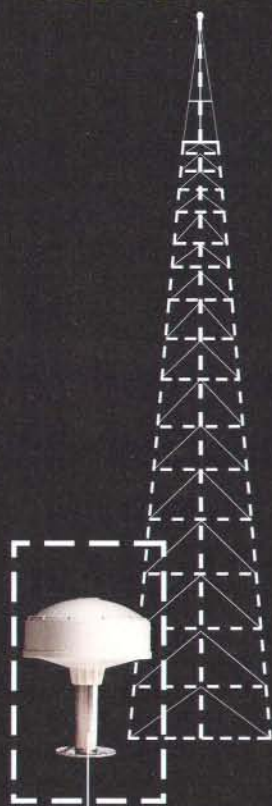


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Mountain View, California, the fiber carrier, surrounded by an armored steel pipe, is visible as it comes out of the ground and enters Netscape's machine room. Employees joke, "That's where the money goes in."

But building the servers themselves is a bit more complicated. Today no single computer is large enough to handle the onslaught. (See "The Domain Name System," page 84.) Instead, Andrews has built a system that distributes the load across more than one machine. There are actually more than 30 computers pretending to be [home.netscape.com](http://home.netscape.com), all of them holding identical Web pages. Your browser randomly picks one when you click the big N on Navigator or press one of the directory buttons.

Each server is also equipped with a lot of memory. That's because each user who downloads a page from a Netscape server ends up reserving a tiny piece of the computer's memory. There are limits within the Unix and Windows NT operating systems on how many open network connections can exist on the same machine. Most workstations are hard-pressed to handle more than 20 to 40 simultaneous connections. Crammed with 128 Mbytes of RAM apiece, each Netscape server can handle more than 4,000 connections.

Eventually, though, Netscape will have to spread the load not merely across more servers, but across the planet itself. That's

### Better, stronger, faster

It seems that the key to stopping Web slowdown – and building a new, industrial-strength Internet – is for everyone working within the five network spheres to do their part.

In the days following the Great Blackout of '65, businesses and government officials took stock of the disaster and tried to figure out what to do next. The Federal Aviation Administration ordered large power generators for 50 airports across the country so that they could continue to operate during future blackouts. Likewise, hospitals, tunnels, drawbridges, even gas stations around the Northeast were told to make sure that they developed alternative sources for electricity. Yet few of them did.

Instead, the power industry made good on the Federal Power Commission's challenge to turn good service into "virtually perfect service." Part of the formula was that consumers paid both for what they used and for the peak demands they placed on the system. The resulting reliable power system has substantially benefited all of society – even residential users, who might not see the value in paying for uninterruptable service until they lose a few refrigerators' worth of groceries.

If the Internet is to become a true information utility, the same commitment to "virtually perfect service" will have to be made. As that happens, companies and

**The key to stopping Web slowdown,  
and providing virtually perfect service, is for everyone  
working at all network junctures to do their part.**

why Andrews plans to build server farms in Paris, Stockholm, Sydney, Tokyo, and Hong Kong. It makes no economic or technical sense to install high-speed transpacific circuits so that Netscape's Japanese-speaking users in Japan can click the big N and see the Japanese version of Netscape's homepage appear from a Web server in California. Moving the Japanese content to Japan would simultaneously give users better performance and cost less to operate.

individuals will find that it makes more and more economic sense to depend on the Internet's infrastructure rather than to attempt to duplicate it with their own private networks. In the end, they undoubtedly will come around to the idea of paying for what they use. ■ ■ ■

*Simson Garfinkel ([simsong@vineyard.net](mailto:simsong@vineyard.net)) moved for the summer from his wired house on Martha's Vineyard to a hot, cramped, steamy apartment in Boston.*



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# Rockets for the Rest of Us

Who says a satellite program  
can't be a garage start-up?

By Heather Millar

[www.wired.com/4.09/spacebiz/](http://www.wired.com/4.09/spacebiz/)

James Kennett is a practical man. He gave up college to help save the family business, eventually making it a successful security-monitoring company in northeastern Australia. At 39, he is rosy-cheeked and enjoys a good joke, but has little time for idle dreams. His motto is "Keep it simple, stupid." He sees technology not as a toy, but as a tool. A million dollars is still a lot of money to him. Yet now, quite by accident,

Kennett finds himself in the forefront of the space business.

In the mid '80s, Kennett saw that there was profit to be made in keeping track of things in a country with vast distances and few people. A vision evolved that was an extension of his experience in security systems: instead of monitoring people's

like James Kennett, bright risk-takers in garages, home offices, and warehouses, all trying to turn established technology into new products or services that will make money. Big money.

The space industry, once the exclusive domain of government agencies and military contractors, is changing. It's starting to look like any old business.

Sure, when it comes to commercial space ventures, big communications satellite networks like Iridium and Teledesic have garnered the most money and the most press. Meanwhile, and largely unnoticed, these monster projects have created a huge demand for launch sites, rockets, systems developers, component manufacturers, and engineers. The energy of this push is jump-starting crowds of small entrepreneurs such as James Kennett. Like the Homebrew Computer Club, which led to the birth of the Apple computer, the very existence of these pioneers may well bring a new paradigm to an entrenched industry - replacing big with small, complicated with simple, institutional customers with Everyman. Aerospace people have talked for decades about making space profitable, accessible to the average businessperson or consumer. Finally, it may be happening. Who says a satellite network can't be a mom-and-pop operation? Hey, not so long ago, no one at IBM or Digital thought there was a market for the personal computer.

For about a decade, events have been building toward a world in which James Kennett can be the first on his block to build his very own satellite network. First, the space shuttle *Challenger* blew up, causing the US government to rethink its space investments. Then NASA's budget shrank, and it started to encourage commercial space projects. The Cold War ended, and the US and other governments relaxed regulations. This allowed international cooperation, private space launches, and mass-market satellite imaging so precise it was once available only to spies. Finally, the Internet exploded onto the world scene, dramatically increasing demand for clear, fast phone lines. That has meant demand for satellites.

"Unlike other industries, this one is booming. What's driving the whole space market is the satellites," says Marco Caceres, a market analyst who distributes the World Space Systems Briefing, a constantly updated overview for investors, manu-



Imagine that after each transatlantic flight, the airline threw away the plane. That's the hitch today's space entrepreneurs are working to fix.

doors and windows, he imagined monitoring far-flung railroad switches, power lines, even the cows, water tanks, and fences on remote ranches. Australia's enormous scale ruled out a cellular solution; the number of repeating towers necessary would be prohibitively expensive. The obvious answer: satellites.

Kennett figured he could slap rugged, simple transmitters on bulls and water tanks, then keep tabs on them with a handful of shoebox-sized satellites. Today, with about A\$6.4 million (US\$8 million) - his own money, a partner's, and a loan from a local bank - Kennett plans to launch his small constellation. Sound outlandish? Think again. Kennett's project is a major feature of the Australian Space Office's five-year plan.

Dreamers, even kooks, have always hovered in wobbly orbit around the aerospace world. But these days, the low end of the aerospace industry looks less like a *Star Trek* convention and more like the personal computer arena of 20 years ago. It's sprinkled with people



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facturers, and industry watchers. "What drives the satellites is the telecommunications."

While huge communication systems like Teledesic will feature two-way messaging, some things need go only one way. Kennett's system is as simple as a canary in a coal mine, and works the same way. Just as the birds warned miners of dangerous gasses when they died, so Kennett's transmitters will signal when things go wrong. Every transmitter will have a code number, and periodically, each will send up a message that says, for instance, "I'm unit 24689, and I'm in condition 2." If the transmitter goes silent, the client can assume there's a problem and dispatch someone to check. Because Kennett's satellites need only listen, not relay commands to the transmitters, he can get by with very, very small satellites.

This bargain-basement approach was so unusual that, for a time, Kennett had trouble getting aerospace people to take him seriously. In typical space engineering, complex systems have always ruled. "What I wanted to do and what they were offering were incompatible. They kept pushing technology-driven systems that were more than I needed," Kennett says. "I wanted to do low-cost data monitoring, low data rates, small packets." When Kennett told aerospace professionals he wanted to launch a whole system for the cost of a

outside of each panel and provide power. The computer boards and communications equipment will occupy the flip side of the solar panels. This pod-shaped structure will protect a balloon-like tank of propellant.

To hold down costs, the KITComm satellites will piggyback on the launches of other, larger missions. As low-cost "secondary payload," they will go up on Ariane rockets launched from French Guiana. Later, they may be launched from a proposed spaceport in Australia. Released into the orbital plane of the primary payload, the KITComm satellite's balloon of propellant will push it into its proper orbit.

Kennett has budgeted US\$4.5 million for the first stage of the project. He estimates the total cost for satellites, launches, and ground stations will range from \$8 to \$10 million. If successful, Kennett will be the first entrepreneur to finance a space project the same way someone finances a few McDonald's franchises – and for about the same price.

The Australian government has placed itself foursquare behind KITComm's vision, making it and the new launch site a major part of a recent five-year plan for space initiatives. The government has granted KITComm a "scientific apparatus license" that will allow the company to launch the satellites and refine its concept. If all goes well, the world's first micro-satellite network could go into orbit late

scientist entrepreneurs. As president of AeroAstro, a small company specializing in budget space ventures, he has managed to get government and academic institutions to underwrite what are essentially test projects: an X-ray imaging sensor, electronics to support experiments on the effects of space on various materials, a satellite to support high-energy astrophysics experiments. All the while, Fleeter was working to answer this question: How small and how cheap can a satellite be and still do something useful, even profitable?

At 42, Fleeter looks like an enthusiastic student, despite the fact that his tightly curled hair is graying at the temples. He invariably dresses in running shoes, jeans or khaki shorts, and cotton short-sleeve shirts. His body is thin, legs toned from biking to his office in Herndon, a suburb of Washington, DC. AeroAstro's headquarters couldn't be more removed from the sleek, sprawling campuses of the huge aerospace firms. Tucked between a day care center and a storefront church, the exterior has all the charm of a warehouse. Inside, models of satellites hang from exposed steel roof supports. Projects in various stages of evolution dot the office carrels, the do-it-yourself machine shop, the dust-free "clean room" where space systems are assembled. The dress code is strictly university, the etiquette informal and jocular.

Fleeter started out conventionally enough, getting degrees in economics, aerospace engineering, and thermodynamics from Brown and Stanford. He went to work at the usual places – first Caltech's Jet Propulsion Laboratory, then TRW – but grew frustrated with the hierarchical, bureaucratic ways of big companies. In 1988, he decided to open his own shop. "My friends in the business really thought I was the sailor who had fallen from grace with the sea," Fleeter says, leaning back in his cluttered office. "But I wanted to prove that you could do things differently, that you could do more for less."

At present, the most ambitious private projects on the drawing board involve the aerospace industry's version of the Internet bandwidth problem: how to get lots of stuff where you want it, quickly and cheaply. Imagine that after each transatlantic flight,

## **Kennett might be the first entrepreneur to finance a space project like a McDonald's franchise – and for about the same price.**

single conventional satellite, they laughed.

Kennett persevered. He found an Australian company that would build transmitters for A\$80 to \$160 (US\$100 to \$200) apiece. Eight satellites – built for the low, low price of US\$200,000 each – will receive the transmitters' messages and forward them to a central control station to be operated by Kennett's company, KITComm Pty. Ltd. Each satellite will weigh about 6 pounds and look like a faceted football. Solar cells will cover the

next year. Starting in Australia, Kennett hopes to expand to Southeast Asia and Latin America. "Once we prove the damn things work, it will be a nice little business," Kennett says.

In Virginia, Rick Fleeter, who is developing and building Kennett's satellites, has even greater hopes for the KITComm network. He hopes it will at last prove that tiny space birds can make money. Fleeter may be in the vanguard of the guerrilla rocket





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the airline threw away the plane. That's basically the situation with space launchers today. Several private companies are racing to develop a reusable, relatively low-cost launch vehicle, and the spoils will go to the first one that does. Yet the reality remains years away.

Fleeter, in contrast, set out to develop projects that could get done simply, with off-the-shelf technology. For instance, AeroAstro's plan for a launch vehicle, the PA-2, doesn't depend on developing new technology like other firms. Instead, the company is building a small rocket with what's out there already. "Step by step," Fleeter says, "we'll get to the way-out stuff."

Working this way, Fleeter and his team of several dozen created the polar opposite of a conventional aerospace firm. "Space people get all manic about 100 percent reliability, parts, sterility, the 'team above the individual.' But see where that approach has gotten us: boring, really expensive, and unreliable space programs," Fleeter says. "What I think is really important is design and workmanship. Talented people make better satellites."

Engineers and programmers at AeroAstro get recognized for their talent, not buried in a project payroll list. Explaining the company's style, Fleeter jokes that he subscribes to the Woolly Mammoth School of Management. "When the Neanderthals went out to hunt mammoth, they didn't

and fly 20 small satellites and space instruments – all successfully. So far, company projects have hitched rides on larger rockets as secondary payloads, but that may change. After a successful test flight of its own minirocket last spring, Fleeter may soon be able to offer launch services as well. AeroAstro's missions have included communications, remote sensing (tracking earthbound objects), astrophysics, education, and space technology. The spacecrafts – some only a few pounds, others a couple hundred – have ranged in price from \$500,000 to a few million dollars. Most conventional aerospace companies spend that much on feasibility tests. AeroAstro satellites usually get off the ground in a year or so, and none has taken longer than three years. NASA projects often take decades to get from drawing board to reality.

While AeroAstro had proved it was possible to build and launch low-budget spacecraft, a nagging problem remained. The company hadn't yet shown that it could really make money that way. Its client list wasn't so different from Lockheed's, including the usual government and academic customers: NASA, the US Air Force, MIT, the Canadian Space Agency, Boston University.

"We kept looking for that one commercial application that worked," Fleeter says. "It seemed like we'd never find it." In James Kennett's Australian cow-tracking

**The aerospace industry is grappling with its own version of the Internet bandwidth problem: how to get lots of stuff where you want it, quickly and cheaply.**

draw up an org chart," he says. Rather than rigid specialists, he wants his staff to be Renaissance scientists. At the funky Herndon office, the person who designs a part is quite likely to be the one who also makes it. The budget doesn't have room for legions of machine technicians. Nor does it have room for million-dollar studies or triple and quadruple redundancy in its systems. "You have to accept some risk," Fleeter says.

Rick Fleeter has to date helped build

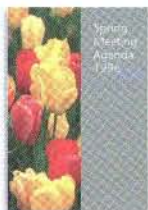
system, Fleeter hopes he's at last found the project that proves the vision.

Dozens, perhaps hundreds, of companies are likewise trying to turn this concept into a reality. Consortia have already converted NASA facilities in California and Florida into private spaceports. Construction is under way on an Alaskan launch facility; others are being pushed in New Mexico and Virginia. Additional start-ups want to finance private moon missions and orbit-



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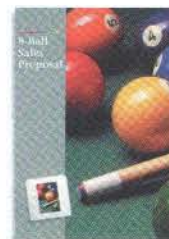
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## **ELECTROSPHERE**

ing hotels, to create Dick Tracy-style wristwatch satellite receivers, to provide space data showing where the potholes are and whether buses are on schedule, to build systems that find hikers lost in the wilderness and oil tankers on the high seas.

In the US, commercial space ventures brought in \$6.5 billion in 1994, an increase of nearly 23 percent over 1993's \$5.3 billion. Private projects now make up a significant portion of this \$28 billion industry. Since many of the smallest, and most daring, companies are privately held and don't yet have a positive cash flow, it's impossible to gauge their clout in dollars. But their newfound respectability is obvious at industry gatherings.

A cocktail party following an aerospace conference in Cambridge, Massachusetts, a few months ago is typical of the new atmosphere. In one corner of the room, a McDonnell Douglas representative talked animatedly to a lawyer who plans to send a robotic rover to the moon – with private funds. Not far away, a young engineer from Lockheed Martin listened to an entrepreneur who wants to make a buck sending people's ashes into orbit. With pleased disbelief, an executive from Boeing's Defense Space division looked at the newcomers and at his former colleagues in big-time missile and space projects. "Ten years ago, you'd never have caught these people in the same room together," he said.

Not so long ago, the suits might not have

Even so, the really big companies still tend to operate at a level far above the entrepreneurs. They're the ones working on the expensive challenges such as commercial applications for the international Space Station, or new launch vehicles. A few start-ups are going head-on with the heavyweights. Seattle-based Kistler Aerospace Corp., for instance, is trying to develop a reusable launch vehicle just like Lockheed Martin and Rockwell. However, most newcomers to the arena are following one of two strategies: they are trying to offer stripped-down services at cheaper prices like KITComm, or they are moving into areas that have only recently promised commercial returns.

Entrepreneurs in the satellite messaging business tend to fall into the first category. They hope to service those who don't need all the bells and whistles: trucking companies, utilities, and shippers who just want to get simple messages back and forth. Better than half a dozen of these firms now have applications before the FCC. Remote sensing firms fall into the second category. With the government relaxing regulations that once forbade public access to detailed satellite images, several small companies are working to launch "geographic information system" (GIS) satellites that will beam back detailed pictures of Earth's surface. Until a couple of years ago, if you didn't have a security clearance, you couldn't buy a US satellite photo with bet-

## **Private moon missions and orbiting hotels.**

### **Dick Tracey-style wristwatch satellite receivers and space data pinpointing where the potholes are.**

even bothered to laugh at the dreamers. They would have simply dismissed them with a clubby smirk. No more. Instead, the big firms are starting to copy the start-ups. Many huge firms – Lockheed Martin, Boeing, and McDonnell Douglas for instance – now have incubator "commercial" divisions. Lockheed recently launched a new rocket design in only 27 months – warp speed by NASA standards. They're noticing the likes of James Kennett and Rick Fleeter.

ter than 30-meter resolution. In other words, anything smaller than 30 meters would look like fuzz. Thanks to deregulation, 1- to 3-meter resolution US satellite photos will come on the market. At that clarity, cars, roads, and trees come into focus. Farmers can track the progress of their crops down to individual rows, scientists can log detailed data about forests and oceans. EarthWatch Inc., a Colorado-based start-up, will soon launch one of these mini systems, planning a network of at



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least four satellites that will circle the globe and constantly update available images. The launch of its EarlyBird satellite will make it the first private space imaging system. Other companies with slightly different plans – Space Imaging, Resource Imaging, Resource21, Orbimage – are not far behind.

Big or small, what every aerospace entrepreneur is looking for is a customer who didn't know he needed satellite-based services – and didn't know he could afford it. The Holy Grail for a space start-up is the quirky niche application.

Perhaps no customer could occupy a narrower niche than *Cyprinodon diabolis*, a fish popularly known as the desert pupfish. They are the last remnants of schools that swam in the waters that covered much of the western United States between 10,000 and 20,000 years ago. When those lakes began to retreat, and then dried up at the end of the last Ice Age, many fish species just died out. But a few, like the pupfish, took refuge in the low spots, such as spring-fed pools that didn't need rain to keep the desert at bay. *Diabolis* ended up in a column of water called Devil's Hole, on a 40-acre reserve near Death Valley National Monument, in Nevada, not far from the California border. It is an interruption in a beautifully desolate plain of ash-colored gravel and sagebrush, a gash in the stone that reveals a narrow, deep

If the water in Devil's Hole falls even slightly, the pupfish are in big trouble.

The National Park Service has monitored the water level in Devil's Hole since the late 1960s, when development in the Las Vegas area began to tax the aquifer that covers the southern third of Nevada. Floats attached to stick measures were hooked up to a pen-and-paper data logger. Every week or two, a ranger would drive the 50 miles from the nearest settlement, churning over the last 10 miles of dirt road to check on the fish. Not only was this inconvenient, but if the water dropped precipitously the day after a check, the fish were out of luck.

Enter Orbital Communications, or Orbcomm, a company offering limited messaging services, with 2 of a planned 28 satellites in orbit. It's the first of the low-Earth orbit communications satellite systems to get into space. Orbcomm goes beyond the pared-down KITComm plan. Its system can handle two-way messages. Not only can its \$500 ground-based communicator talk to the satellites, but the satellites can relay messages and commands to the communicators. However, Orbcomm can't handle the high data-rate, voice, and video promised by the big constellations.

With one of its parent companies, Orbital Sciences Corporation, Virginia-based Orbcomm is at least an order of magnitude larger than tiny KITComm or AeroAstro. Yet Orbital Sciences Corporation's annual sales of \$300 to \$400 mil-

meaning to each ASCII character. In the case of the pupfish, an ASCII A might mean the water level in Devil's Hole is normal, and an ASCII Z might mean the water has dropped perilously low. Three or four times a day, one of the Orbcomm satellites passes within range of Devil's Hole. A digital transmitter hooked up to the water sensor system sends up a simple message – A, or Z, for instance. The satellite forwards that to Orbcomm's control center in northern Virginia. The center then sends the message to the water monitoring company, and on to the park service.

Theoretically, the park service could forward commands back to Devil's Hole, perhaps to empty a tank in the pool to raise the water level. For now, though, the pupfish have only one-way communication. Since the system is still being tested, the park doesn't pay for it yet. Orbcomm estimates that it will eventually cost \$30 a month. "We explored the idea of satellites some time back, but they were too expensive," says Mel Essington, a mining engineer for the park service.

The Orbcomm satellite relaying ASCII codes from the pupfish pool looks oddly like a 95-pound mosquito: a long antenna wrapped in a web of wire extends from a fan of three disc-shapes: two solar panels of metallic blue and a CPU that looks like a can for movie film. Several times a day, 775 kilometers above the Death Valley brush, the satellite passes by, picking up a blip indicating the pupfish situation. On other passes, the otherworldly mosquito picks up blips from Chicago buses, trucks on interstates, oil rigs in Texas, explorers in the wilderness. With each blip, connections between the earthbound and the orbital become more mundane. With each transmission, it seems more likely that Orbcomm, KITComm, AeroAstro, and other space entrepreneurs will really make a buck this time. They may even bring rockets within reach of the rest of us. ■ ■ ■

Heather Millar (73504.3651@compuserve.com) writes about technology and society.

**Talk with author Heather Millar live in the Wired Arena ([www.wired.com/arena/](http://www.wired.com/arena/)), Tuesday, September 10, at 3 p.m. PDT.**

## Every aerospace entrepreneur is looking for a customer who didn't know he needed satellite-based services – and didn't know he could afford it.

pool of Caribbean-blue water.

This is probably the most restricted habitat of any vertebrate in the world. Here, 300 to 1,000 of the dark, inch-long fish chase each other like puppies through a vertical world. The surface of their pool is perhaps 6-by-20-feet. No one is quite sure how far down the water goes, but divers have explored to 500 feet. The pupfish, though, live only in the top 80 feet or so, feed in the top 30 feet, and spawn only on a small ledge 18 inches below the surface.

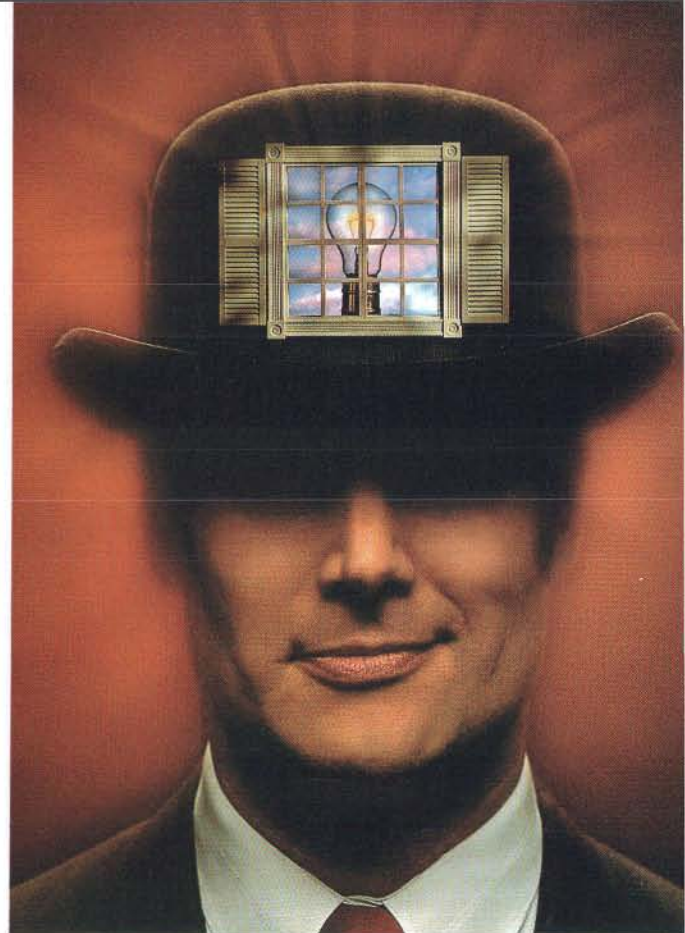
lion make it 1/100th the size of Lockheed. The budget for its entire satellite constellation – \$250 million – is probably less than the commissions that may be generated on Wall Street when the really big constellations like Teledesic are fully financed.

Orbcomm (through Ohio reseller Steven Waters Monitoring) offered the pupfish and park service a solution they never thought they could afford: satellite monitoring. Using a technique called "derived coding," Orbcomm assigns a value or



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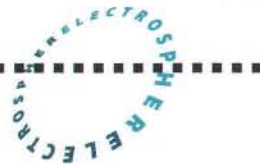
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# Space Case



It's an odd pair: **former Reaganite Alexander M. Haig Jr.**  
and **transsexual businesswoman Martine Rothblatt.**

**They want to cut the multibillion-dollar satellite industry off at the knees.**

By Mark Lewyn

[www.wired.com/4.09/skystation/](http://www.wired.com/4.09/skystation/)

It was a sunny day in early April, and General Alexander M. Haig Jr. and his 44-year-old son Alex were on a mission. Not a military mission, but they did expect to come under fire. The two were off to brief officials at the Federal Communications Commission about Sky Station International Inc., a bold plan to

build a sky-based communications network that could potentially deflate some high-profile telecom satellite ventures. The elder Haig, 71, is a strategic adviser and part-owner; his son is president and chief operating officer.

A month earlier, Sky Station had laid out its elaborate plan in an inch-thick

known transsexual who used to go by the name Martin and is the father of four. Two years ago, Rothblatt made the big gender switch and since then has spoken out extensively about transsexualism, both in a book (1995's *The Apartheid of Sex: A Manifesto on the Freedom of Gender*) and on talk shows such as *Donahue*. One senior FCC official who was at the Sky Station presentation said: "It was one of the more unusual meetings I've been to in a long time."

## Fly the crowded skies

What united the unlikely duo of Haig and Rothblatt? Not money alone. Both are already millionaires. Haig made a bundle off stock options he was granted as an early director of America Online Inc. – the stock has split four times over the last three years. He has also made a fortune putting together international business deals through his company, Worldwide Associates Inc. Rothblatt's money came through several ventures she helped create: Satellite CD Radio Inc., a digital radio service; WorldSpace Inc., a satellite service for Africa, Asia, and Latin America; and Panamsat, a satellite television network for Latin America.

Instead, Haig, Rothblatt, and their partners see Sky Station as a chance to do something big – really big – and make money too, perhaps in an IPO down the road. Rothblatt's journey across the sexes has never clouded that goal. "The fact that I'm transgender has no more relevance than if I were Catholic or Buddhist," says Rothblatt. "It never once came up." The younger Haig concurs, noting that Rothblatt's extensive legal experience is invaluable, regardless of her sexual orientation.

If Sky Station works – and many are skeptical that it will – it could create "the most impressive broadband wireless communications system available in the world," says Haig.

The Sky Station partners are not alone in their enthusiasm about the potential of the wild blue yonder. There is an excitement about space communications unlike anything since the early '60s, when satellites made international phone calls and TV broadcasts commonplace. Huge parts of the globe – from villages in Sri Lanka and South Korea to much



**The Buck Rogers redux design of Sky Station belies its lofty goal – an inexpensive alternative to satellites that provides wireless phone service and Internet access worldwide.**

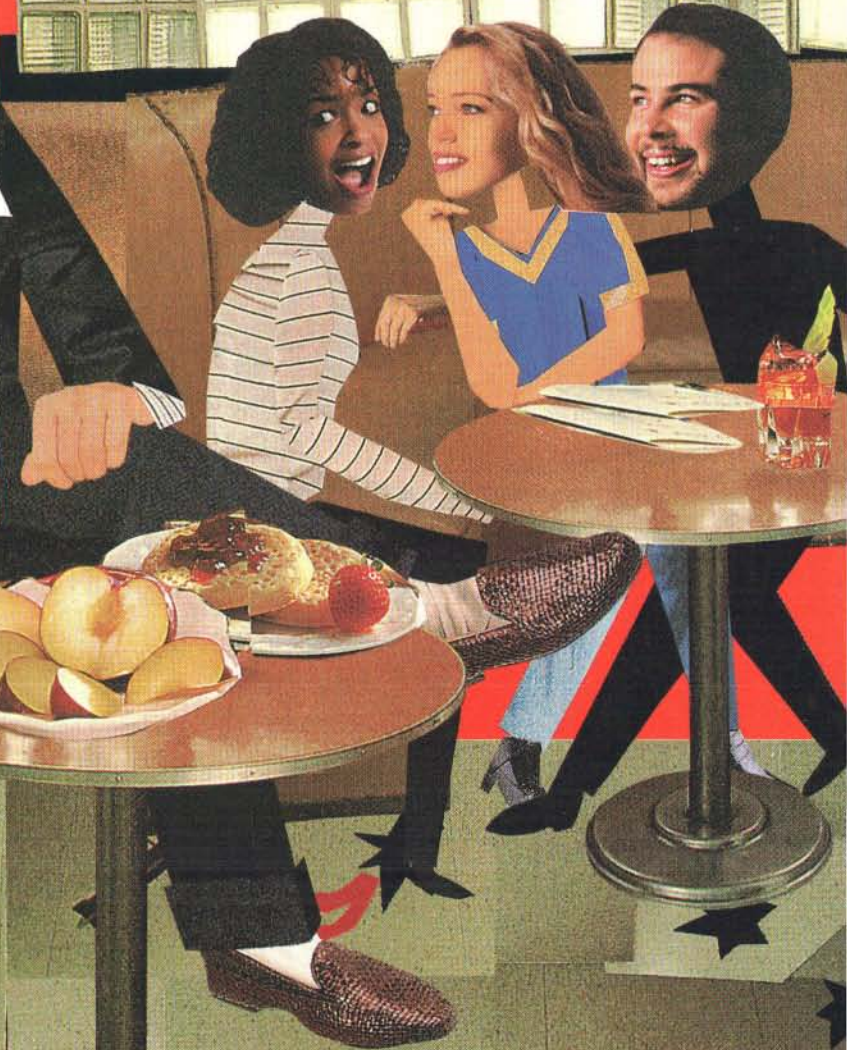
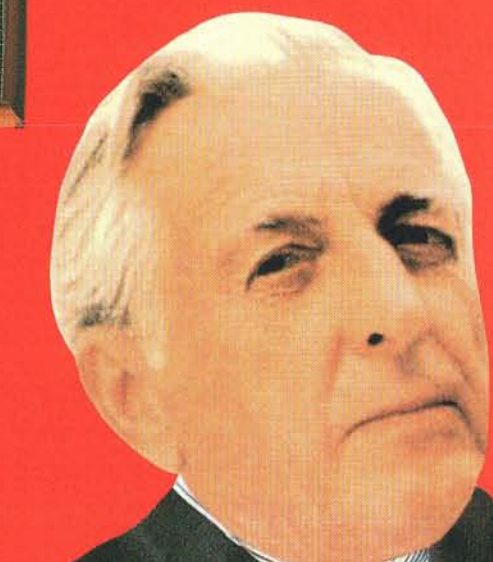
filing to the FCC. Its goal is to bring high-speed wireless Internet access and phone service to 80 percent of the world's population by 2004. But to hit that lofty target the Chantilly, Virginia-based company would need the federal agency to go to bat for the project. First, by allocating the necessary radio frequencies; then by urging communications ministers from around the globe to do the same when they meet at the World Radio Conference in Geneva next year.

The Haigs were accompanied by businesswoman Martine Rothblatt, 41, their new partner and a successful regulatory attorney in Washington, DC, for more than a decade. Rothblatt gave an impressive demo, describing in detail how Sky Station could revolutionize wireless telecommunications.

Perhaps as interesting as the presentation was the odd juxtaposition of Haig, the starchy secretary of state under Ronald Reagan, and Rothblatt, a well-



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of Africa, Australia, and South America – still have no basic telephone service, let alone advanced telecommunications.

Stringing wires on utility poles in the world's far-flung corners would cost a fortune, perhaps tens of billions of dollars. From the sky, however, satellite beams can sweep over swamps and deserts. More than 100 million people are expected to use cellular telephones worldwide by 2000, up from about 40 million today, according to the Washington, DC-based Cellular Telecommunications Industry Association. Communications companies are salivating.

Right now, on the drawing board at least, the empty reaches of the heavens look darn crowded. Motorola Inc., for example, has raised over US\$1 billion to build its \$3.3 billion Iridium system, a network of 66 satellites designed to provide wireless telephone service anywhere in the world by 1998. Craig McCaw and Bill Gates are backing a \$9 billion project called Teledesic, which in the next few years hopes to develop its own global phone network using 840 satellites. In addition, the Loral Space and Communications Ltd. and Qualcomm are working on the Globalstar network, a \$2.2 billion satellite-phone system with 48 spacecraft that will go into operation in 1998. Meanwhile, American Mobile Satellite Communications, a consortium owned in part by AT&T's McCaw unit, wants to provide

to float 250 comparatively inexpensive "platforms" in the stratosphere about 20 miles above terra firma. The 17-ton platforms, which would cost only a few million dollars apiece, will float in the area between jet cruising altitude and where satellites orbit. Each will be suspended from two airships that look like miniature versions of the *Hindenburg* dirigible.

The Sky Station approach offers several advantages over rival satellite systems. LEO satellites move from pole to pole. As one satellite heads over the horizon, another takes its place, providing continuous coverage. That means the entire network must be in place before investors see a dime in return – an expensive proposition.

By contrast, the Sky Station platforms – which are 300 feet long and 120 feet wide – do not orbit the Earth. They are geostationary, meaning they stay in place relative to the rotation of the Earth. The key is a nonpolluting corona ion engine. The device takes the ions that occur naturally in the air and converts them into thrust, which is then used to hold the platform stationary in the 15-knot winds occurring at that altitude.

The payoff could be quick. Unlike LEOs, there's no need to build the entire network to get one part working. Pop a Sky Station over New York and you can immediately offer service. The 250 Sky Stations will be placed aloft over a five-year period, at the

platforms, unlike satellites, can be positioned to cover only populated areas – instead of, say, oceans – making them more cost-effective. Rothblatt says the company hopes to generate \$5 billion in annual revenue by 2004.

#### Vacuum cleaners in orbit

Sky Station wasn't hatched as a telecommunications network, though. It began as an environmental project in the mid-1980s, when UCLA physics professor Alfred Wong dreamt of developing a giant, floating vacuum cleaner that would suck up and zap the chlorine molecules that help destroy the ozone layer. Such a device would have to remain aloft for long periods and be able to navigate. So Wong created the corona ion engine.

In late 1988, Wong contacted Harry "Skip" Darlington IV, chair of the Ozone Society, an environmental group in Middleburg, Virginia. It was Darlington, with a balloon pilot's license and extensive flying experience, who introduced the idea of using airships to keep the platforms afloat. Wong liked the proposal, and Darlington signed on as a partner.

But the ambitious plan still needed financing. After several years of development work, Wong and Darlington enlisted R. Moses Thompson, founder and president of Chantilly, Virginia-based Team Technologies Inc., a consulting firm that works with development banks. Moses and his partner, Edward Silansky, were skeptical. Silansky suggested that Wong and Darlington patent the corona ion engine and form a business, never believing they would.

But in 1994, Wong applied for the patents, and Earth Sciences Technologies International was formed. Silansky joined as CEO; Darlington became chair. Sensing a larger opportunity, the two rejiggered the focus of Sky Station and the idea of a sky-based telecommunications network was born. "There wasn't anyone in the original team who saw the full extent of the telecom potential," says Silansky. "They had been thinking about this solely as an environmental project."

The environmental half of the project is still very much alive, however. Each

## Sky Station will float platforms 20 miles up, above where jets fly, but below where satellites orbit.

wireless phone links through much of North America. And ICO, the London-based satellite company, is also scrambling to assemble a satellite pocket-phone system.

Most of the proposed satellite systems – including those of Motorola, Loral, and Teledesic – are "low Earth orbit" (LEO) systems that use small spacecraft orbiting a few hundred miles up. The Sky Station approach is radically different. Rather than launch a fleet of pricey satellites – which can cost anywhere from \$50 million to \$200 million each – the company wants

rate of 50 a year. "Every time we deploy a Sky Station we have a revenue-generating service," Rothblatt says.

The platforms are closer to the Earth than satellites, so radio signals don't travel as far. That means smaller receivers, since they don't require as much battery power. Because the platforms are held up by airships, there's no need to spend big bucks on pricey rockets.

The price tag for the whole shebang is only \$800 million, as opposed to the billions rivals like Teledesic and others are talking about. Finally, the Sky Station



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Sky Station platform is planned to serve a dual purpose – provide telecom services and clean the ozone. The structure of the company reflects these shared values. The holding company is Earth Sciences Technologies International, which handles the environmental side. The Sky Station International subsidiary concentrates on telecom. Wong and Darlington see the duality as compatible and, perhaps more importantly, necessary to make their environmental dream come true.

But it was obvious that such a venture would require big bucks. Darlington eventually hooked up with Haig, a well-known international businessman who was instrumental in setting up a joint venture between the Chinese government and McDonnell Douglas to manufacture planes in China. Haig and his son, Alex, met with the group in July 1995. The Haigs were impressed and came aboard.

#### Battling bureaucrats

From the beginning, it was clear that the regulatory issues surrounding Sky Station would be as great a challenge as raising the cash necessary to float the project. The Haigs knew they would need a regulatory expert to negotiate this thicket of red tape. Rothblatt's name quickly popped up. In her previous gender, she earned a reputation as a savvy regulatory lawyer who could nimbly slalom through the governmental obstacle course. She had

She has spent long hours bouncing from one federal office building to another, selling to government regulators who are rarely enthusiastic about radical ideas. For starters, the Defense Department must give its blessing, since it might be possible to put a surveillance camera on a Sky Station platform and spy on military facilities. Rothblatt must also help convince Federal Aviation Administration officials that Sky Station won't fall out of the sky, as Motorola officials suggest. At least when satellites tumble from orbit, Motorola argues, they usually burn up when re-entering the atmosphere. The low-flying Sky Station platforms wouldn't have a chance to incinerate.

Sky Station's giant dirigibles are also reminiscent of the *Hindenburg*, an unfortunate analogy that recalls the dramatic old film clip of the giant zeppelin crashing to the ground in flames while a radio announcer wails about "the humanity."

The FAA must grapple with the preeminent safety issue: will these things fall out of the sky? Sky Station officials say no. The airships holding the platforms up have multiple shells. If the outer shell bursts, several backup shells keep it aloft. The chance of an explosion is minimized because they use nonflammable helium to levitate; the *Hindenburg* was filled with highly volatile hydrogen. And if the helium somehow seeps out, each platform has parachutes to slow its descent.

### The FAA must grapple with the preeminent safety issue:

#### Will these things fall out of the sky?

the right mixture of business toughness and personal finesse. Several years ago, for example, Rothblatt represented a telecommunications company seeking the FCC's permission to operate off the East Coast of the US. So Rothblatt dubbed the company the Far Eastern Regional Network, or FERN. The acronym was no accident: it was the surname of one of the FCC commissioners.

Rothblatt says she was bowled over by Sky Station. "I thought this was a fundamental breakthrough – akin to electricity. I really did."

Even Sky Station's competitors say Motorola's safety concerns are exaggerated. Russell Daggatt, president of Teledesic, says his company "explored some of these dirigible concepts" but went with the more conventional satellite approach.

To convince the FAA, Sky Station is working with retired three-star General James Abrahamson, who ran the Strategic Defense Initiative, or Star Wars, for the Pentagon and was director of development for the space shuttle program.

The FCC must also decide if the Sky Station platforms are located in space,

which is open to anyone, or airspace, which is controlled by each country. If foreign regulators decide they are in their stratosphere, then every country in the world would have to sign off on having a platform in its airspace – a daunting prospect to be sure. Ultimately, the decision may be left to an international body such as the United Nations-backed International Telecommunication Union.

Rothblatt must also press the FCC to clear out a high-frequency radio spot on the airwaves and persuade the agency to ask other countries to do the same. Again, Motorola has stood in the way, arguing that the FCC should not denigrate its reputation on such a silly idea.

Motorola, of course, has more than the public's safety and FCC's reputation in mind. "If Sky Station solves the safety and regulatory problems, it could devastate the satellite industry," says one senior FCC official.

Sky Station's real competition may ultimately come not from Iridium or Loral, but the rapid construction of land-based networks – hardwired telephone networks as well as cellular telephone systems. China, for example, plans to install 40 to 80 million telephone lines by 2000. According to a report by the US Department of Commerce, almost every country in Asia, Africa, Latin America, and Eastern Europe plans to build cellular telephone systems.

Nonetheless, Sky Station is moving forward. In July, the company began testing a miniature 40-foot version of the platform in an altitude test chamber at NASA's Lewis Research Center in Plum Brook, Ohio. In early 1997, it will launch a 100-foot prototype up 15,000 feet. If that goes well, the company hopes to launch a full-size version into the stratosphere late next year. "We're selling a dream," Haig says. "It's an exciting period, but one where you don't get a chance to put your feet up for long." ■ ■ ■

*Mark Lewyn (marklewyn@aol.com), a former technology correspondent for Business Week, is an executive at CitySearch (www.citysearch.com/), an Internet start-up building digital cities.*



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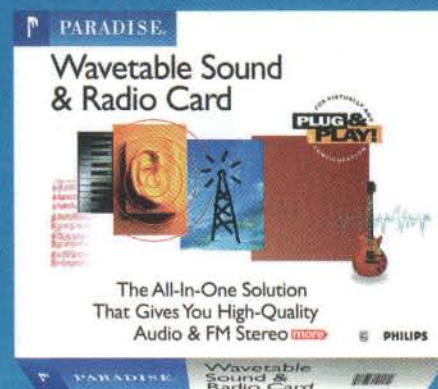
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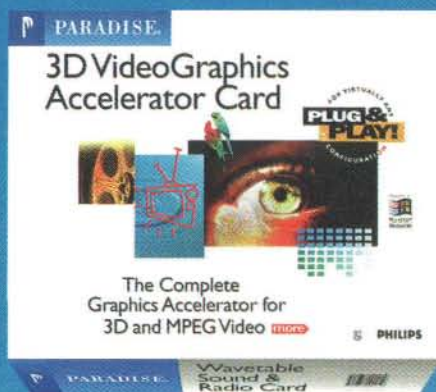
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# Japan Enters the Crypto Wars

The fate of the US's crippling export controls on encryption, as well as Clinton's attempt to revive Clipper, may be decided in Tokyo.

By Stewart Baker

[www.wired.com/](http://www.wired.com/) 4.09/crypto/

**M**any in the digital community think the battle over US export controls on crypto is being fought – and slowly won – in the halls of Congress. And many more think the Clinton administration's attempts to resurrect the ghost of the Clipper Chip – through various schemes ensuring government access to encrypted information – are dead as well. Well, think again.

Stewart Baker, the former general counsel to the National Security Agency from 1992 to 1994, argues that the decisive battle over crypto will take place in the inter-

national, rather than the domestic, arena – and that the player to watch is Japan. His controversial analysis: international consensus may be quietly forming around a trusted third party key escrow system, but Japan still could play the spoiler. Baker is not without his interests in matters crypto. He now advises some technology companies that oppose current export controls and others that expect to participate in a trusted third party system.

what terrorists and criminals will do with an impenetrable network and communications security. Increasingly, this tension between the needs of commerce and those of government is symbolized by the difference between the tales unfolding in two cities, Tokyo and Paris.

## Tokyo's catch-up

Until recently, Japanese industry had little interest in cryptography. A handful of Japanese academics had made contributions to the field, and NTT researchers had developed FEAL, an alternative to the US Digital Encryption Standard (DES), one that was designed to be much faster to implement. But, on the whole, Japan's technology companies left cryptography to the government.

Even there, attention was fragmented. When the National Police Agency needed an encryption system to secure its mobile radio communications in the 1980s, it had to establish its own cryptographic capability. Other agencies, such as the Japanese Ministry of Foreign Affairs, had developed encryption systems for their own communications, but there was no government center of cryptographic expertise.

Internet fever has changed all that. For a variety of reasons – high PC prices, the awkwardness of using keyboards for kanji, and a disinclination to invest in the automation of management (as opposed to production) – Japan has come late to the computer networking revolution. Now, however, it sometimes seems as if the entire country is talking about nothing but the Internet and its wonders.

Along with this fascination has come a familiar refrain: that Japan is far behind foreign industry leaders and that, without concerted effort, it will not be competitive in the coming decade. Those who follow Japanese industry closely also know the second verse: that major technical initiatives funded by government and industry are needed to master the best foreign technology. These initiatives are followed by products that incorporate uniquely Japanese improvements and that are launched with enthusiasm into global markets. While Japan's government-industry "catch-up" campaigns do not always lead to market dominance (for example, in software and HDTV), they usually pose serious challenges to the established market leaders.



The real battle over the future of crypto is being waged between Japan and the US in an international forum in Paris. The real issue: will the new standard allow governments to snoop?

For advocates of commercial cryptography, it is the best of times and it is the worst of times. Never has the deployment of standardized strong encryption seemed so necessary or so close. People increasingly see that cryptography – both digital signatures and confidentiality – can provide the security needed to move vast streams of commercial, financial, and medical data across open networks.

And yet the closer that day seems to come, the more the governments of the world resist, fearing





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Japan's push in the field of cryptography has every potential to do the same. NTT, to take one example, is threatened with an AT&T-style breakup and wants to use its huge research budget for practical commercial ventures with ties to telephony. NTT also has a long history of research in cryptography. In addition to developing FEAL, it has recently announced digital signature and digital cash systems. Hitachi already makes all of the hardware associated with Mondex, the prominent electronic cash system now getting trials in several nations. And two rival ministries, the Ministry of International Trade and Industry (MITI) and the Ministry of Posts and Telecommunications (MPT), are each spending more than ¥11 billion (US\$100 million) this year to support corporate research to develop and test new cryptographic applications, particularly in the field that is said to need them most – electronic commerce and finance.

In short, the concerted attention and billions of government yen that Japan is lavishing on network technology will almost certainly yield a host of Japanese products that incorporate sophisticated cryptography – and soon. In fact, at a recent hearing on legislation to liberalize US export controls, Jim Bidzos of RSA Data Security announced with fanfare that NTT had already built and exported a triple-DES chip that would bust all con-

Agency. While noting that controls posed a risk to US competitiveness, the public summary notes surprisingly little effect so far on US market share – and casts doubt on the quality of foreign competition.

Those findings were crucial to continued administration support for strict export controls. If the report had found that foreign products were of high quality and gaining sizable markets, it would have been a major blow to supporters of controls. Very few policymakers in the US government want to maintain encryption controls if that means forfeiting the cryptography market to other suppliers.

That is why Japan's effort is so important. It stands a good chance of transforming international competition in cryptography, for two reasons. First, Japanese cryptographic products will be very good and very convenient. Second, while they may be developed first for the Japanese market, Japan is not required by international agreement to restrain exports of cryptography – at least not in the aggressive manner carried out by the United States. During the Cold War, Japan did belong to the multilateral CoCom agreement that controlled high-tech exports to the Communist bloc. Since the end of the Cold War, diplomats have labored to create a "new forum" to replace CoCom. But the closest they have come is a loose international agreement not to sell particularly sensitive technologies

In contrast, the US does control ordinary commercial encryption sales to Europe, Asia, and other big markets. At a minimum, crypto exports still require individual State Department licenses, leaving even exporters whose products abide by the controls at the mercy of changing State Department policies toward countries like China. However, the Clinton administration recently proposed shifting that responsibility to the Commerce Department.

It is hard to see how the current policy can survive for long in the face of unrestricted Japanese competition for commercial markets.

### Paris's diplomatic wrangling

Which brings us to Paris – the heart of the crypto counterrevolution. Not only has France long imposed some of the strictest limits in the developed world on domestic sales of encryption, Paris also is home to the Organization for Economic Cooperation and Development (OECD). And it is the OECD that is hosting multilateral talks on how governments should respond to the challenge of commercial encryption.

Like Japan's great technology companies, American and European computer and software makers have shown great interest in cryptographic applications for computer networks. But the United States and the European governments with the greatest cryptographic expertise have been reluctant to let their companies market any encryption their executives choose. France and Russia have even restricted domestic use of sophisticated encryption. But simply restricting encryption will not work. The business case for strong encryption is too compelling.

Instead, Western governments are increasingly attracted to a variant of the key escrow encryption scheme made famous by the Clipper Chip.

In its current incarnation, key escrow is known as trusted third party encryption, so called because backup crypto keys are held by a third party in case either the user or the government needs access to the encrypted data. Unlike Clipper, this offers more advantages to businesses that

## US export controls can't survive for long with unrestricted Japanese competition in crypto.

trols. He even passed two of the chips around from senator to senator.

The prospect of Japanese entry into this market strikes at the heart of US controls on encryption. The future of these controls depends on the policymakers maintaining confidence that controls do not seriously hurt American industry. While many in industry challenge this view, the government has few doubts. A classified study of the world encryption market was prepared last year by an odd-couple combination of officials from the Commerce Department and the National Security

(including encryption) to a small number of pariah régimes and their armies.

This new agreement is unlikely to have much effect on Japanese encryption exports. The agreement restricts sales to only a handful of countries that are inconsequential as encryption markets; it would not preclude Japan from selling encryption to other countries. It calls only for notification of such sales – notification that may occur after the fact. So, other nations have no veto over encryption sales by Japanese companies. At best, they have a chance to lobby the Japanese government.



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might need to recover lost data.

Digital signatures systems already generally require some trusted third party to certify the original signatures. However, trusted third party encryption is untried and likely to be more costly than slapping DES into source code. Plus, it's much more controversial for telecommunications than for stored data. If governments want trusted third party encryption to become the standard, they will have to put some muscle behind that effort. And they will have to coordinate closely. Moving a global market will require a global agreement.

## US efforts to get a global key escrow standard can't succeed unless Japan comes into the fold.

That, of course, is why the United States has asked the OECD to midwife an international policy agreement on encryption by early 1997. But agreement in the OECD depends on consensus, and that has thrust Japan's ordinarily self-effacing diplomats squarely into the spotlight.

At first, it seemed that Japan would welcome the opportunity to take an assertive stance against regulation of encryption. The earliest OECD meetings were attended by large delegations from MITI and MPT – the two agencies most interested in cryptography's commercial prospects. The police and prosecutors who are so prominent on the US delegation were not to be found on Japan's. Japanese representatives openly questioned the workability of encryption controls. And they made it clear that Japanese politicians would not cheerfully embrace the idea of controlling encryption to make wiretaps easier for law enforcement. Wiretapping is still viewed with deep suspicion in Japan and is barred in all but a handful of cases by Japan's constitution. If it is hard to sell Americans on wiretapping in the abstract (and it is), the job is even tougher in Japan.

But that was the first few meetings. By June, the most recent session, Japan had largely changed its tune. Suddenly, a representative of the Japanese police was not just a delegate – he was assigned to deliver much of Japan's presentation. And once he had spoken, Japan seemed to go silent for

the rest of the session. Instead, a dwindling band of smaller countries – principally Canada – took on the task of stressing the importance of privacy and free markets.

What gives? There are a lot of possible explanations. Perhaps the assertive diplomatic style of the earlier meetings simply attracted too many critics inside the Japanese government. Or perhaps continuing internal discussions moderated Japan's free-market predilections. After all, Japan has more experience with high-visibility criminals using encryption than even FBI Director Louis Freeh does. The

perpetrator of the 1995 Tokyo subway gassings was Aum Supreme Truth, a high-tech religious sect that used encryption to try to prevent authorities from reading its computer files. And the use of encryption for money laundering remains a major concern for such powerful institutions as the Bank of Japan and the Ministry of Finance.

Or maybe Japan began to worry that it would be on the losing side of the debate. Other countries that had earlier expressed doubts about trusted third party encryption also seemed more subdued at the recent international gathering. Meanwhile, advocates of the approach, such as the UK and the US, put forward substantial new plans for implementing trusted third party encryption. France even had a brand-new telecommunications bill in its legislature that more or less would mandate the use of trusted third party encryption. All this added to a sense that some kind of international trusted third party system was coming, like it or not.

But equally important, Japan was uncomfortable with the prominent role its plans have played in the US debate over export controls. With the help of the US Senate and *The New York Times*, Bidzos of RSA turned the Japanese triple-DES chips into a major media event. Suddenly, as one Japanese diplomat complained privately, the US media were making a big deal out of something that didn't war-

rant such attention. The producer of the chips was really an NTT subsidiary, the Japanese said, and the chips were old (1.2 micron) technology – more a speculative flier than the first shot in a crypto war.

### Play ball

Japan's new stance may signal nothing more than a tactical decision not to take the lead in opposing an agreement in Paris. The Japanese government is still spending billions of yen on electronic commerce technology – and very little if any of that is going into trusted third party systems. The NTT triple-DES chip may have been mostly hype, but more serious products are surely on their way, and nothing prevents them from being marketed more or less everywhere.

On the other hand, the new Japanese position may reflect the beginning of a bigger change inside Japan. Law enforcement, national defense, and foreign affairs officials may have begun to exercise new clout within the Japanese government. Japanese companies may now believe that escrowed encryption will be so heavily favored by European and American governments that it will be a commercial success.

In the end, the attempt within the OECD to reach an international agreement on trusted third party encryption will fail if Japan's new stance is only tactical. If Japan has simply decided to lie low and hope for a weak OECD agreement that lets its companies sell whatever they want in export markets, then the pressure of world-class Japanese cryptography on the market will soon make US export controls an unaffordable luxury. In short, it is unlikely that the US-led efforts in the OECD can succeed if Japan does not agree to bring its technology companies into the "trusted third party" fold.

So, will events in Tokyo or Paris decide the future of encryption controls? The answer is Tokyo. Paris can prevail only with Tokyo's consent. ■ ■ ■

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*Stewart Baker (sbaker@steptoe.com) advises companies on legal issues relating to cryptography and technology at Steptoe & Johnson law firm in Washington, DC.*



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# Letter from Jail

By Ed Cummings

"The future of writing is in space, not in time."  
— William S. Burroughs

*Last year, phone phreak Ed Cummings was imprisoned under a little-known provision of the Communications Assistance for Law Enforcement Act of 1994. Under this law, criminal penalties can be assessed against anyone who "knowingly and with intent to defraud uses, produces, traffics in, has control or custody of, or possesses" a telecommunications instrument that has been modified to obtain unauthorized use of telecommunications services, or hardware or software used to obtain unauthorized access to telecommunications services. (See "How Good People Helped Make a Bad Law," Wired 4.02, page 132.)*

*During a search of Cummings's home, police discovered a tone dialer that had been modified to obtain free calls from pay phones, and computer software that could alter the identification codes of cellular phones. Although there were no signs this equipment had been used illegally, the evidence was enough to charge Cummings with possession "with intent to defraud." Cum-*

*mings is the first to admit that he's no Boy Scout. Nevertheless, his story is a nightmare of legalistic double-talk and national security alarmism that casts a pall over other attempts at Net legislation such as the NII copyright bill and the Clipper key escrow proposals — both ripe for arbitrary abuse by law enforcement.*

From dashboards to back-packs, GPS technology is everywhere. But something important is being lost — the ability to get lost.

It isn't just physical. Lost-and-found symbols have long given meaning to our personal quests. What will it mean if this rich vein of archetypal material is all played out?

Our behavior will change.

## Getting Lost

By Richard Thieme

checks and balances will regulate the global village.

Then those resilient selves will kick in. If the Earth becomes a grid of invisible tripwires, we'll leave it. Perhaps into outer space, but more likely inner space.

Connecting on the Net, after all, is more like being cells in a body than being individuals. We lose and find ourselves in the emergent Self that is putting itself together on the Net.

*Richard Thieme (rthieme@lifeworks.com) is a professional speaker and business consultant.*

We'll feel exposed. Small-town

Dear *Wired*,

Naturally, I'd prefer to have sent you this letter digitally, but here in prison, I have no access to computers — just "collect only" inmate telephones. My case is complicated, and it has become a focal point in the rift between the hacker community and the United States Secret Service — a battle that continues even while I languish in jail.

The crux of the issue is that I've been imprisoned for most of the last year for the mere possession of speed dialers and an IBM laptop computer. I did not use this equipment to commit any fraud, nor have I been accused of committing fraud or gaining unauthorized access to telecommunications services. The US attorney's office has stated for the record that there were "no victims" in my case.

My prosecution is not about fraud, or theft of services, but about information. Specifically, I believe that I aroused the wrath of the Secret Service by making public photographs of undercover Secret Service agents working in the Philadelphia field office. These same photographs were later broadcast by WXTF-TV in Philadelphia. Apparently, the Secret Service doesn't like it when undercover agents have their pictures broadcast on TV — especially when the pictures show them picking their noses.

Still, I am the first casualty of CALEA, the Communications Assistance for Law Enforcement Act, which Congress passed and President Clinton signed in

1994. While the most infamous parts of CALEA pertain to the development of a massive wiretapping infrastructure for use by law enforcement, other dangerous and vague provisions of the law went uncontested because no hearings, committee deliberations, or floor debates on the legislation were ever undertaken.

For years, when a local phone company would start to run out of phone numbers — an increasingly frequent occurrence, thanks to new services such as paging and cellular — it would ask state regulators for permission to split a geo-

## Battle of the Area Codes

By Mark Lewyn

graphic region in two, with 50 percent of the customers getting a new area code.

But lately, some of the Baby Bells have been trying to "overlay" new area codes, with the new codes assigned only to new customers.

The reason is transparent: the Bells don't want any of their customers to suffer the inconvenience of switching to a new area code. Instead, they want to foist it on the customers of competing cellular and local phone companies.

The FCC is considering putting a stop to the practice. That's the right thing to do, and it will ensure competition takes hold more quickly.

*Mark Lewyn (marklewyn@aol.com), a former correspondent for Business Week, is an executive at Internet start-up CitySearch in Pasadena, California.*

"Content is a glimpse of something, an encounter like a flash. It's very tiny — very tiny, content."  
— Willem de Kooning



I was convicted for the mere possession of hardware and software that is readily available at any RadioShack store or on the Internet. Indeed, with CALEA's use of such ill-defined terms as "unauthorized access" or "unauthorized use," simply owning a modem could be interpreted as possession of "hardware or software used for altering or modifying telecommunications instruments to obtain unauthorized access to telecommunications services." Likewise, CALEA's "intent to defraud" provisions are so broad and vague that the mere knowledge of any potentially "illegal" application of common hardware or software can constitute a federal crime.

I don't believe that law enforcement agencies will apply the statute to pursue millions of PC users. But I do fear that the government will misuse CALEA to selectively prosecute "undesirable" individuals by applying the law in an arbitrary and discriminatory manner – as it was done in my case. My goal is to prevent this from happening.

My 7-month federal prison sentence has been served in its entirety, and my 6- to 24-month sentence for a probation violation (stemming from a misdemeanor charge of "tampering with evidence" by removing the batteries from a touch-tone dialer) qualifies

me for release sometime between now and next November.

Nevertheless, I'm trying to launch an appeal of my case, even though I may soon be free. Why? Because I strongly believe that CALEA contains badly worded and dangerously vague language. As the first person in the country ever charged with violating this onerous legislation, I'm in a unique position to try and strike the law down.

However, being in prison makes it difficult. I have no access to a direct telephone line or online information resources.

Thanks for your interest in this story, and please forgive my handwriting – I'm used to using a keyboard.

Sincerely,  
Ed Cummings (aka Bernie S.)

*Ed Cummings (bernie@2600.com) is a computer consultant and writer for 2600 magazine. More information about his case can be found at [www.2600.com/law/bernie.html](http://www.2600.com/law/bernie.html).*

Computer technology is not inherently biased against women, African-Americans, or Native Americans. What really disfavors them is text, the traditional code for communicating with that technology. Text has appealed to white American males who've historically had ready access to books and literate learning. It's been less attractive to members of other gender and racial groups which, in the

## The Interface Is the Message

By Bernard J. Hibbitts

face of prejudice and limited educational opportunities, supplemented their literacy with strong oral traditions.

Today, however, sophisticated forms of human-computer interaction are replacing text with speech. The World Wide Web is offering a multimedia experience that's both seen and heard. In these circumstances, people can use computer technology to reclaim, extend, and emancipate their voices. This suggests that the interface – not the medium – is the message.

*Bernard J. Hibbitts (hibbitts@law.pitt.edu), a professor of law at the University of Pittsburgh, writes about law, media, and the senses.*

"The higher the technology, the higher the freedom. Technology enforces certain solutions: satellite dishes, computers, videos, international telephone lines force pluralism and freedom onto a society." – *Lech Walesa*

## Lost in Translation

By Jose Manuel Tesoro

The first time China was united was in 221 BC, when Shi Huangdi, ruler of Qin, defeated the last rival warlord. During his reign as China's first emperor, he ordered the construction of the Great Wall and built a tomb guarded by thousands of terra-cotta soldiers. He also left another, no less significant monument: the first standardization of Chinese script, which, until then, had used more character sets than there had been warring states in China.

In 1985, researchers at Xerox began a similarly ambitious project: creating a standard for encoding all characters used by the world's major tongues, so that computers anywhere could correctly represent text inputted in any language. The 16-bit code set, later dubbed Unicode, includes Arabic, Bengali, Chinese, and many other scripts, as well as ASCII. But the scheme ran into trouble: Unicode's available

"Living inside the system is like driving across the countryside in a bus driven by a maniac bent on suicide." – *Thomas Pynchon*





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122



"If I can't dance, I don't want to be part of your revolution."  
— Emma Goldman

We badly need a coherent way of thinking about what it means for other people's code to be running on our personal computers, and for programs on our PCs to be talking with programs on other people's computers.

The people who invented the PC said, "Hey, it's personal — we don't need a full-blown operating system with security and multitasking." So first we had viruses, until finally we systematized the kludges by which we fend them off.

## Social Computing

By Phil Agre

Then we connected our PCs to the Internet, and we haven't seen a tenth of the heck that's going to break loose from that.

The problem is that a "personal computer," despite its misleading name, is fully as social a creature as the old time-sharing systems ever were. And yet its design embodies no coherent model of how to negotiate those social relationships.

*Phil Agre (pagre@ucsd.edu) teaches at the University of California, San Diego, and edits The Network Observer (communication.ucsd.edu/pagre/tno.html).*

65,536 codes could not support the more than 75,000 Chinese characters used in Chinese, Japanese, and Korean. So the standard's designers decided that only about 20,000 of these would be included. This action has the East Asian computing community enraged at Unicode's perceived insensitivity.

Chinese and Japanese programmers complain that their scripts have been treated unfairly. Greek, Latin, and Cyrillic letters received their own codepoints, they say, so why compromise the set of Chinese characters? It was as if the architects of a building chose the best rooms for themselves, then let everyone else crowd into the space remaining.

In Unicode's defense, its designers point out that the first few thousand Chinese characters it supports cover all those used regularly in East Asian countries. Even words more often found in dictionaries than in conversation, as well as specialized, historical, or archaic proper names, were encoded. And about 8,000 codes were set aside for characters considered mistaken, useless, or basically forgotten.

Besides, the alternative — a 32-bit standard — contains 4.3 billion possible codes, which is impractical for most computers.

The world's scripts would fit best in, say, an 18- or 19-bit standard, says Asmus Freytag, Unicode's vice president for marketing. But, he points out, computers were designed to work with powers of two. So selecting 16 bits — and 20,000 characters — was the best, if not perfect, solution.

The debate centers on seemingly minor matters: the inclusion/exclusion of variants or little-used characters. But for societies, small differences have always held a larger-than-life importance. Details, after all, are what distinguish groups from each other. That is why societies remain loyal to their beliefs and customs, at times in the face of what others might consider reason.

The Chinese characters that Unicode leaves out may be incorrect, outdated, or irrelevant. But it is difficult to dispel the concern that people's cultural heritage has been truncated or mutilated for the sake of computers' convenience. It raises a provocative question: Are we allowing our cultures to be shaped along lines set by our own inventions?

The emotions Unicode's adversaries draw on are potent. Yet the standard's backers, which include major computer multinationals, are also influential. The code set is appearing in operating systems like Windows NT and Apple's Copland. Version 2.0, scheduled to be released this August, combines codes to support a possible additional 1 million characters. These will be given to less widely used scripts, dead ones, or new ideographs. But it is too late for the remaining 40,000 or so rejected Chinese characters.

Like Shi Huangdi centuries ago, computer technology today is imposing its own unifying order. Yet people's pride in their differences shouldn't be disregarded or underestimated. Standards are important, but people rebel if they feel themselves jammed into the ordered spaces of circuitry. Unicode's Chinese-character quandary will hardly be the last time the fuzzy thinking of humans battles the logic of their machines.

*Jose Manuel Tesoro (joel@iohk.com) covers technology for Asiaweek.*

People talk about making computers easier to use, but it usually ends up that humans are made easier for computers to use.

Take the keyboard, for example. Among people who type, it's sadly acknowledged that in 20 years our arms will be permanently warped and twisted from the repetitive impact inflicted by today's keyboards. We've been promised everything from voice input to brain-computer interfaces, but whether due to neglect or lack of knowl-

edge, none of these tech-

nologies ever seems to work.

Instead, people wear braces, grab at wrist rests, and give away squishy balls at trade shows.

Sure, someday voice recognition will work. But by then, biology will have corrected and selected those *über*-arms of our future; one day, evolution will yield comfort.

*Jesse Freund (freund@wired.com) is editorial assistant at Wired.*

## Natural Correction

By Jesse Freund

"If the human race were wiped from the earth, the computers would keep going until the energy supplies ran down. But without an interpreter, could they really be said to be processing something called information?"  
— George Johnson



**"ABSOLUTE GARBAGE."**

— *Slime Magazine*

**"PURE TRASH."**

— *Ratweek*

**"PU"**

— *The Daily Urinal*

**"IT STINKS."**

— *The Sunday Compost*

**"TWO THUMBS UP (OUR NOSES)."**

— *Fungus & Mildew*





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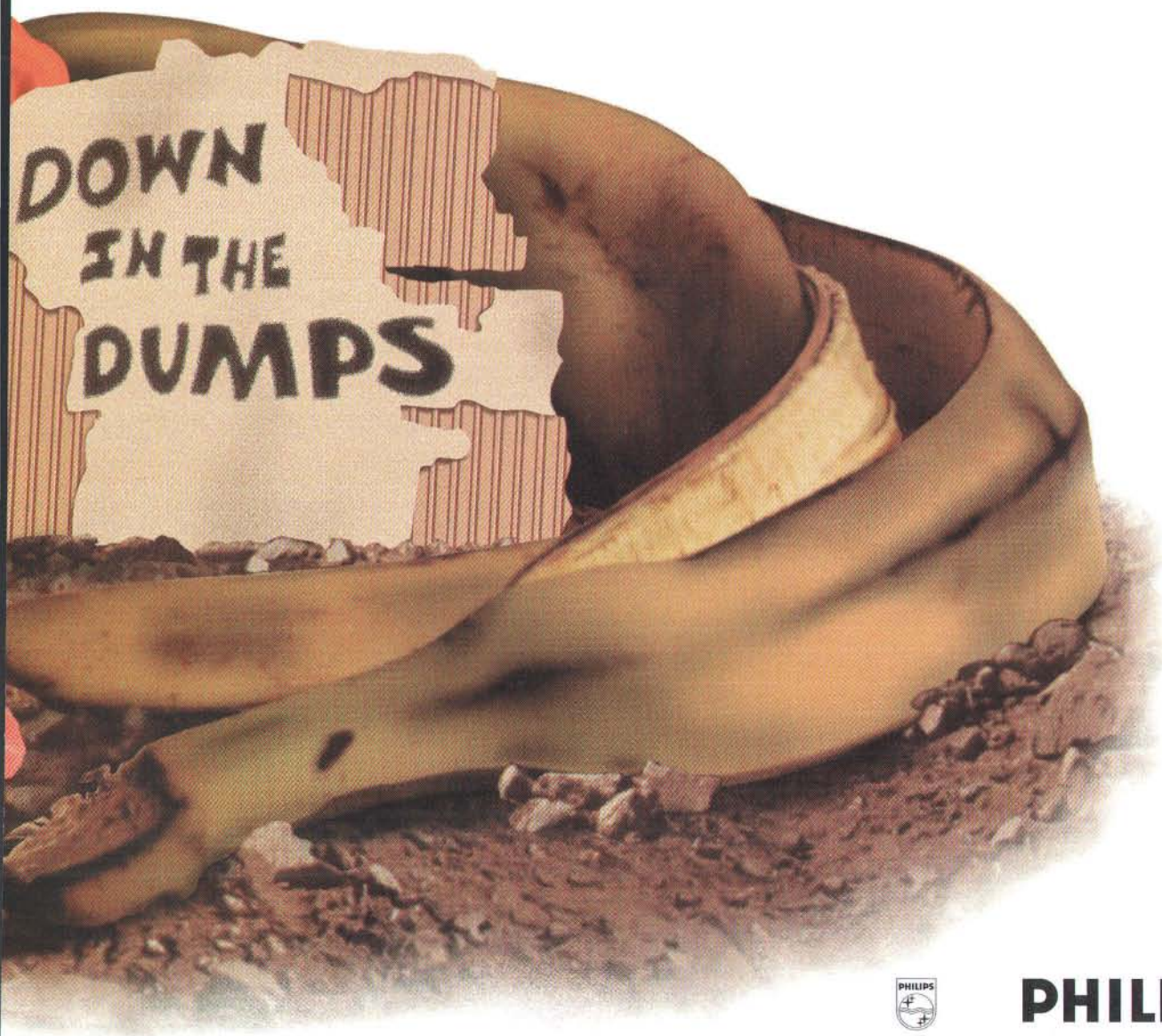


# "WE COULDN'T HAVE SAID IT BETTER OURSELVES."

— *The Blubs*

The Blubs, your average family of space aliens, are in a heap of trouble. They've crash-landed in a garbage dump and need you to help them put their ship back together so they can get back home to their less odorous planet.

That is, before a gang of intergalactic bank robbers can get ahold of them. Find out why the critics are calling *Down in the Dumps* the funniest, best-looking and smelliest 3D graphic adventure game ever to (dis)grace a computer screen.

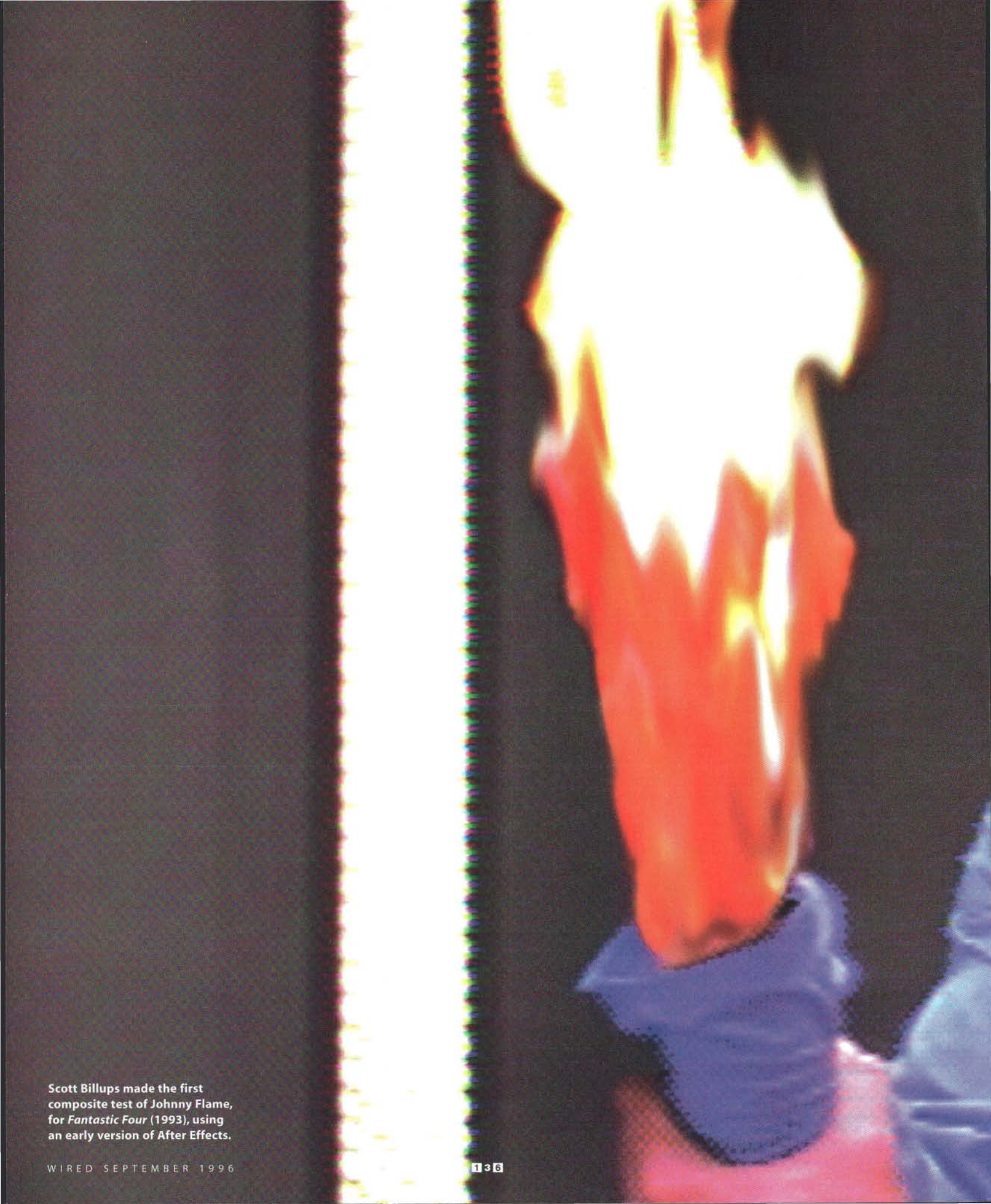


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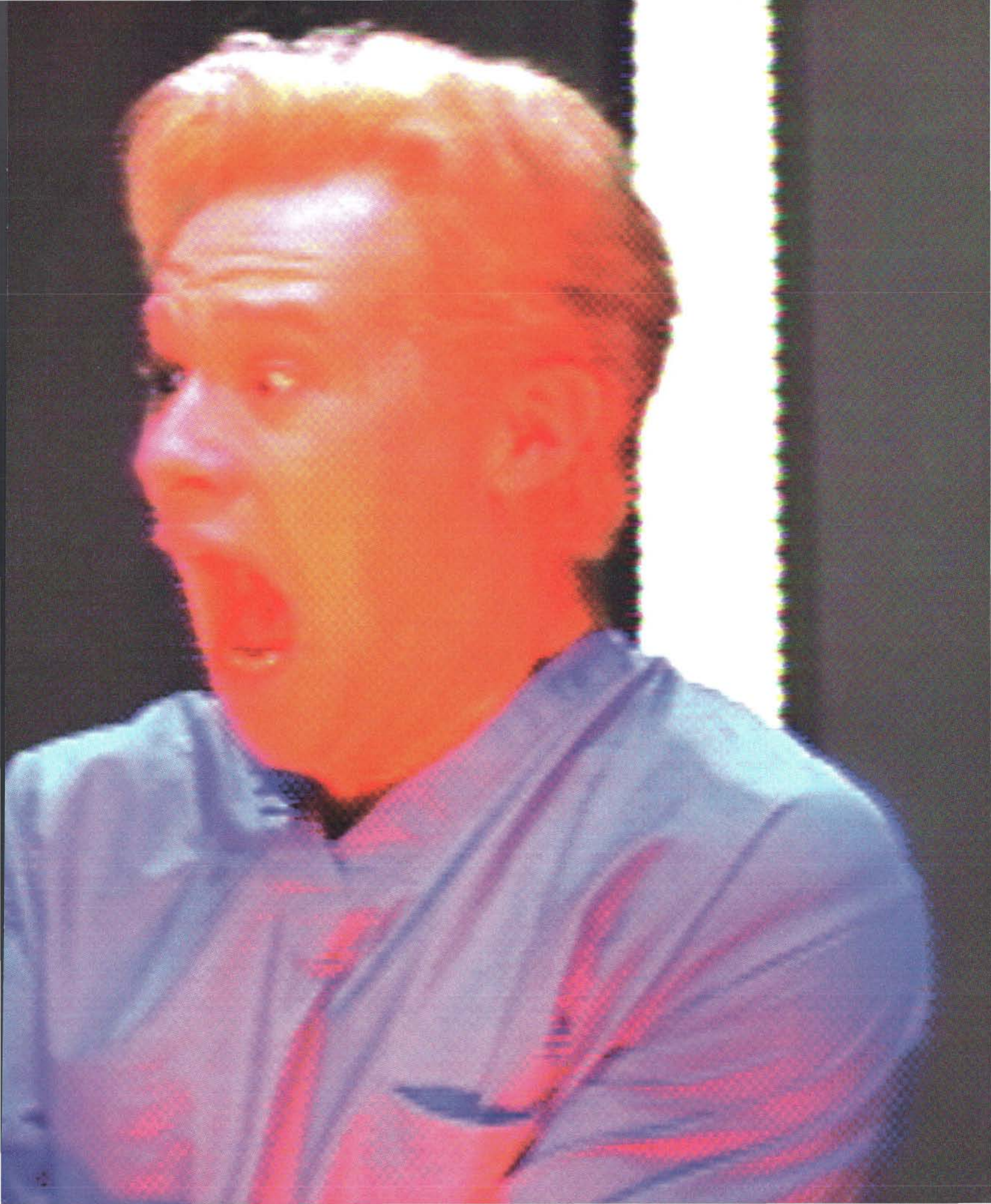
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Scott Billups made the first composite test of Johnny Flame, for *Fantastic Four* (1993), using an early version of After Effects.









For *Hellraiser: Bloodline*, released this spring, Billups pulled "taffyheads" using Alias geometry software.









Who needs ILM? Completely digital movies will be made  
by lone ranger cinemagicians like Scott Billups.

Welcome to Basementwood.

By Paula Parisi

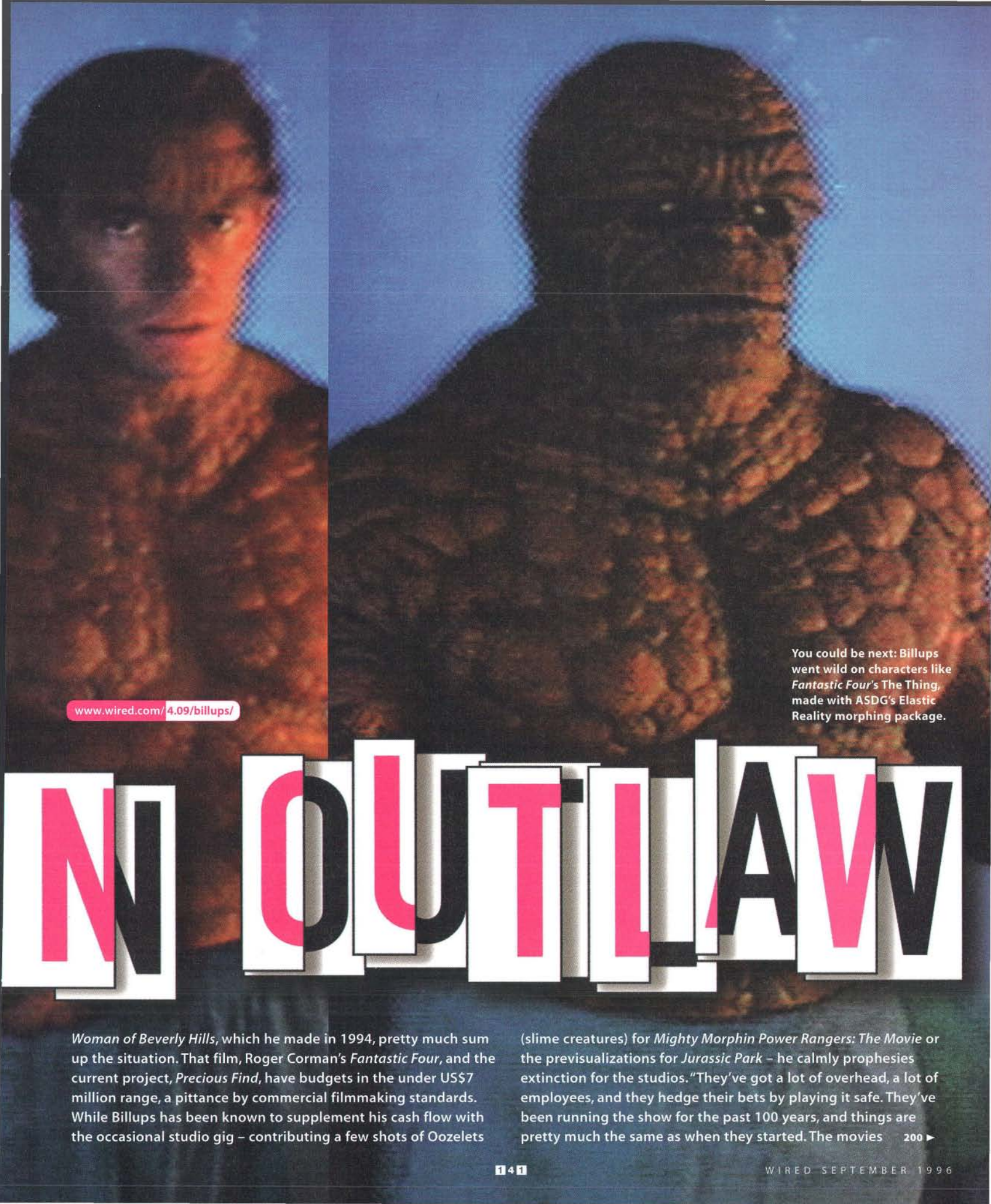
# SHOT BY A

**A**t first glance, Scott Billups's Spanish-style manse looks like any other in the Pacific Palisades area of Los Angeles: a hacienda on one of those verdant hillsides basking in a high-income hush. It's only when you walk through the living quarters to the backyard, littered with asteroids, that you realize he's not living quite like the neighbors. The pile of technojunk is a by-product of one

of Billups's latest movie projects, a space Western called *Precious Find* that's being assembled in his silicon-powered basement lair.

The movie's prospectors-in-orbit theme is appropriate: Billups is one of Hollywood's baddest pixel-packing cowboys, riding on the fringes of an establishment that views him with interest, admiration, and some degree of incomprehension. Titles like *Pterodactyl*





[www.wired.com/4.09/billups/](http://www.wired.com/4.09/billups/)

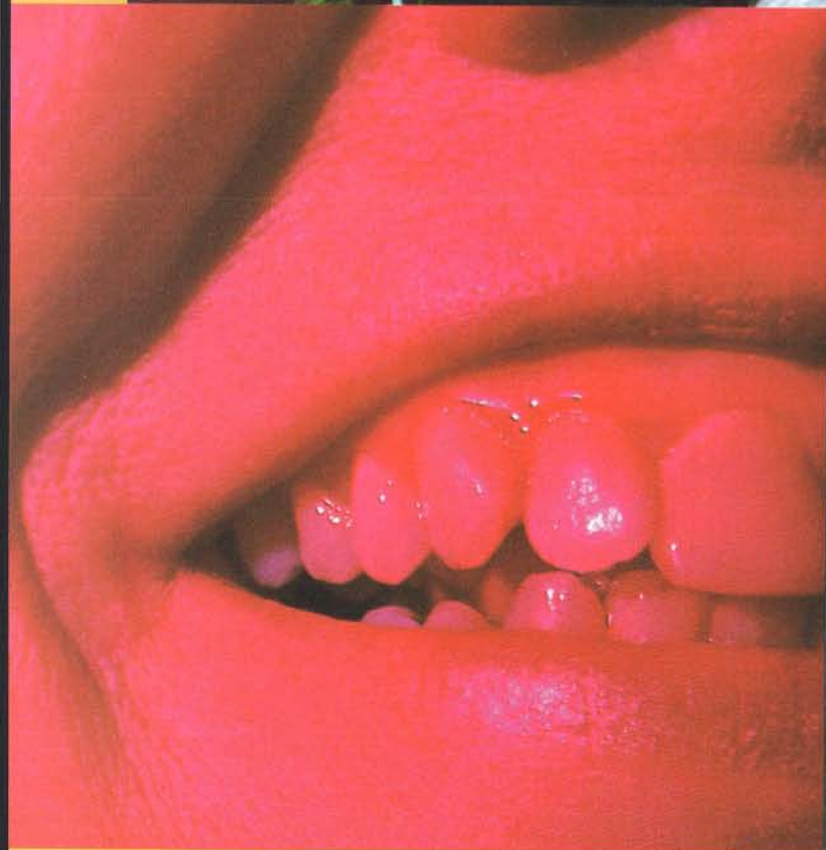
You could be next: Billups went wild on characters like *Fantastic Four's* The Thing, made with ASDG's Elastic Reality morphing package.

# N OUTLAW

*Woman of Beverly Hills*, which he made in 1994, pretty much sum up the situation. That film, Roger Corman's *Fantastic Four*, and the current project, *Precious Find*, have budgets in the under US\$7 million range, a pittance by commercial filmmaking standards. While Billups has been known to supplement his cash flow with the occasional studio gig – contributing a few shots of Oozelets

(slime creatures) for *Mighty Morphin Power Rangers: The Movie* or the previsualizations for *Jurassic Park* – he calmly prophesies extinction for the studios. “They’ve got a lot of overhead, a lot of employees, and they hedge their bets by playing it safe. They’ve been running the show for the past 100 years, and things are pretty much the same as when they started. The movies 200 ►





Photographs by Eric O'Connell



**We wanted  
to know how  
Ann Winblad digs up  
and bankrolls  
the hottest  
new software  
companies.  
So we took her  
boozing  
in Tijuana  
to find out.**

**S**ome of you may not believe this, but in Minnesota in the late '50s and early '60s there was a statewide effort to welcome the Mexican immigrants then streaming into the Gopher State. Every morning, in every classroom, the children of Wonder Bread – blond, optimistic, trusting – sat before a TV-on-wheels for 15 minutes of Spanish lessons with their hosts Paco and Maria.

One never knows where or when such knowledge will bubble to the surface, but this time it appears on a warm spring evening on the lawless streets of Tijuana. Lawless because we are driving on the wrong side of the road in a neighborhood without functioning street lamps. We're moving in circles, looking



*"¿Dónde está el restaurante cerca de la costa?" she blurts out in her schoolbook Spanish.*

If Ann Winblad hunts down emerging software companies with as much finesse as she works on finding us a decent restaurant, she deserves her reputation as one of the most important venture capitalists in the US\$45 billion domestic

# Adventure Capitalist

By David Diamond

for people to give us directions. We're hungry. A stiff margarita wouldn't hurt.

Ann Winblad, a blond and optimistic Minnesotan, is trusting enough to spend an evening in a strange place with a writer and a photographer she has never met. She leans out the window and waves down an overweight woman who is toddling across the street.

software industry, the fastest-growing sector of the US economy. She and John Hummer, a former center for the Seattle SuperSonics, launched their first venture fund in 1989 with \$35 million. Since then, the Hummer Winblad Venture Partners fund has returned \$250 million, yielding an astonishing 50 percent annual return for its investors. By comparison, the average VC produces only an 18 to 20 percent annual yield.

The unlikely pair did it using an equally unorthodox strategy: investing only in software compa-



nies. Together, they are responsible for getting such successes as PowerSoft, Berkeley Systems, and Wind River Systems off the ground. Sensing immense opportunity, they have also created a second \$60 million fund that will focus on investing in Internet companies.

Drop Winblad's name on anyone's voicemail in high tech and you're likely to get your call returned within minutes. Even from EDventure Holdings Inc. president Esther Dyson, one of the best-known analysts in the business. Dyson prefers not to get into the gender trip ("You can't quote me as saying she's one of the most influential women in computing. You can quote me as saying she's one of the most influential people in computing.") but clearly admires the 45-year-old former high school valedictorian and head cheerleader from Farmington, Minnesota. "She does a great job of growing software companies,"

Dyson says, later adding: "She's very Midwestern, in a nice way."

I heard great things about Ann and spent hours considering the most appropriate place to get to know her. I'm convinced that the greatest potential for economic expansion lies in developing countries such as Mexico, where the population rose by 8 million in the past five years alone. The future rests in the pockets of the youth of these nations.

With these factors in mind, all roads led to one locale, the place Krusty the Clown called "the happiest place on Earth": Tijuana. What better time to head south of the border with one of the software industry's most successful financiers than Wednesday – traditionally Underwear Contest Night. Winblad barely hesitated when I asked about spending an evening together in Mexico. Ann breaks away from her overbooked schedule on a regular basis and typically takes a month off each year – in September 1995 she rented a house above Florence, Italy. She owns a beach house on North Caroli-

of unique elements – engineering, distribution, pricing, technology. Any software company should prefer to work with a venture firm that knows its business. Other than direct bit twiddling, Ann has immense expertise in all aspects of the

na's Outer Banks. She bikes, fly-fishes, skis. She is what's known as "a sport." Besides, she says, "I speak Spanish. In case we get into trouble."

### "Riskiest thing I have ever done"

Most venture capitalists like to operate behind the scenes. Not Winblad. She has an active speaking schedule that puts her in touch with start-ups worth auditioning. That makes her a bit of a celebrity. Her self-described 5-foot 2.75-inch, 105-pound package of north country friendliness makes her seem approachable. On Ann's afternoon flight in from Arizona – where the Winblad clan gathered to celebrate her mother's 70th birthday – a beefy entrepreneur recognized her, maneuvered his way into an adjacent seat, and bombarded her with the details of his business plan. She sensed the opportunity: did he know of any good restaurants in Tijuana? Head for the beach, he said.

Which is what we do. Maybe the difference between Winblad and a lesser-evolved venture

capitalist is that when we finally make our way to the beach and can't find any places to eat, she comes up with this brilliant tactic: pull into a nice-looking pharmacy and ask a respectable-looking person to recommend a restaurant. In our car we follow a pharmacy patron to a vegetarian place that has closed for the evening. *How did the Seinfeld team ever miss this plot?*

Someone finally directs us to a nearby seafood restaurant, where we slurp down family-sized, lime-sherbet-colored frozen margaritas. The restaurant owner lets Ann, who is wearing a pale yellow polo shirt with jeans, a Polo belt, and a Calvin Klein backpack, pose for a photograph holding what must be a 50-pound fish. She starts to quote lines from *Buffy the Vampire Slayer* ("Does the word 'Duh' mean anything to you?") and *This Is Spinal Tap* ("He choked on vomit ... It was actually someone else's vomit.") That's when

David Diamond (ddiamond@well.com) is West Coast editor of Fast Company.

**Wired:** What edge does Winblad have over other venture capitalists?

**Gates:** Some venture capitalists take a purely financial view and don't get involved in helping their companies with strategy and hiring. Ann and her partners

**What do you see as a central force in her personality?**

She brings a sense of enjoyment and humor to even the most serious situations. When Ann has a great insight, she'll explain it like it's simple common sense. Ann loves the challenge of her

Warren Buffett. She is incredibly smart. Although she doesn't impose her ideas on other people, she has the confidence to laugh in a friendly way when a poor investment or poor strategy is suggested.

**What motivates her?**

She wants to earn enough to feed [her dog] Laika, and she never knows if Laika will develop

# Swinging Gates

In a candid email conversation, Microsoft head honcho Bill Gates

talks about what makes Ann Winblad tick.

are very hands-on. Their focus on software is very important. The software business has a lot

software business. For instance, she got her companies to focus on the NT platform way before it became popular because she saw it was going mainstream. Now it's paying off.

job and makes it fun for everyone she works with. Her professional approach reminds me a lot of

an appetite for expensive caviar. She also enjoys having a job that includes interviews for which she gets driven to Tijuana and meets



## What better time to gear up and head

### south of the border than on

## a Wednesday –

## Underwear

## Contest Night.

she tells me one of her great epiphanies occurred in college. She discovered that guys from rich families “aren’t any smarter than me.”

It doesn’t take much to picture Ann Winblad as that lost icon, the All-American Girl. She grew up 25 miles south of the Twin Cities, in a town of 2,100. She was the oldest of five kids – four girls and a boy – in one of the nation’s eight remaining functional families. Her dad was the high school football and basketball coach and, later, guidance counselor. After her boyfriend taught her the long jump, she earned a letter competing in a regional track event. I’m not making this up.

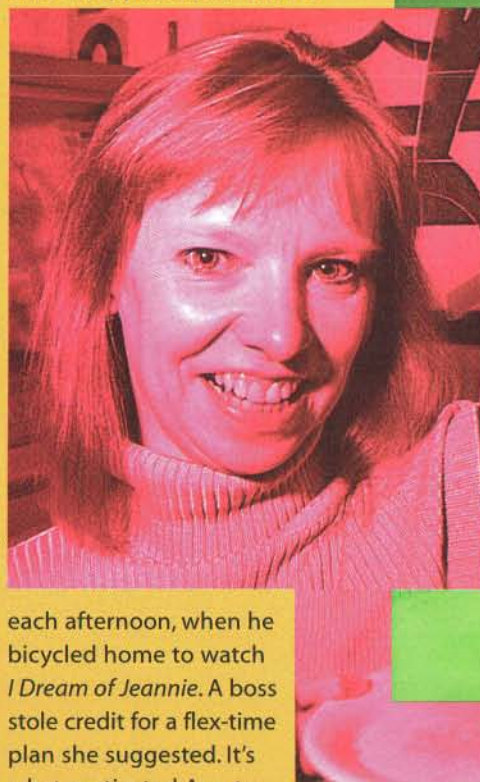
It doesn’t take much to picture Ann in college, either. She probably hasn’t grown a millimeter since she started at the (formerly) all-female College of St. Catherine in St. Paul, where she studied math and business administration on a four-year

scholarship. She then earned a master’s degree in international economics and education from the nearby (virtually) all-male University of St. Thomas. Her entrepreneurial spirit flourished: she would write software programs for male classmates if they had their girlfriends type her papers. She held three jobs: cocktail waitress at a joint where the bartenders called her Sunshine, bookkeeper at a hardware store, and customer service representative for Northwestern Bell.

After college, the job offers rolled in. She was given the opportunity to be a plant manager at a place that wanted someone who looked helpless but wasn’t. The FBI wanted to hire her as a tax agent, which required her to carry a gun. Instead, she opted to work as

a systems analyst at the Federal Reserve Bank of Minneapolis. Why? “It was the coolest building I’d ever seen.”

It would be the last job in which she would work for someone else. She had a cubiclemate who disappeared for an hour



each afternoon, when he bicycled home to watch *I Dream of Jeannie*. A boss stole credit for a flex-time plan she suggested. It’s what motivated Ann to do “the smartest thing I ever did.”

Thirteen months after joining the Fed, she borrowed 208 ▶



policemen on both sides of the border. She told me that she enjoyed this trip a great deal, but warned me not to ever let you drive long distances when I am in the car. Perhaps someone told her that if all of her companies are successful she will grow 6 inches and look like she is 25 instead of 20. Seriously, I think Ann really enjoys working with very smart people on very interesting problems. She loves seeing the companies she has been involved with grow and succeed. She loves seeing the impact of innovative products.

She spoke of the time you vacationed in Cabo and sublet the rental car. Any favorite memories? That particular moment is hazy, as I had just had several margaritas. About an hour after I sublet our only car to complete strangers, I wondered what logic I had applied. One of my favorite trips with Ann occurred when we went to Santa Barbara for a week and got tons of movies from a university library to learn more

about biotechnology. We watched movies for hours even when it was sunny outside. One of our fun discoveries was a series of brilliant lectures Richard Feynman gave on physics which Ann subsequently made available to high school students.

Another time we rented a boat in Greece and all four crew members were named Tony. We rented a motorcycle, pretending we knew what we were doing. But I had never driven one before so Ann (my passenger) ended up being run into several bushes and into a ditch by the road.

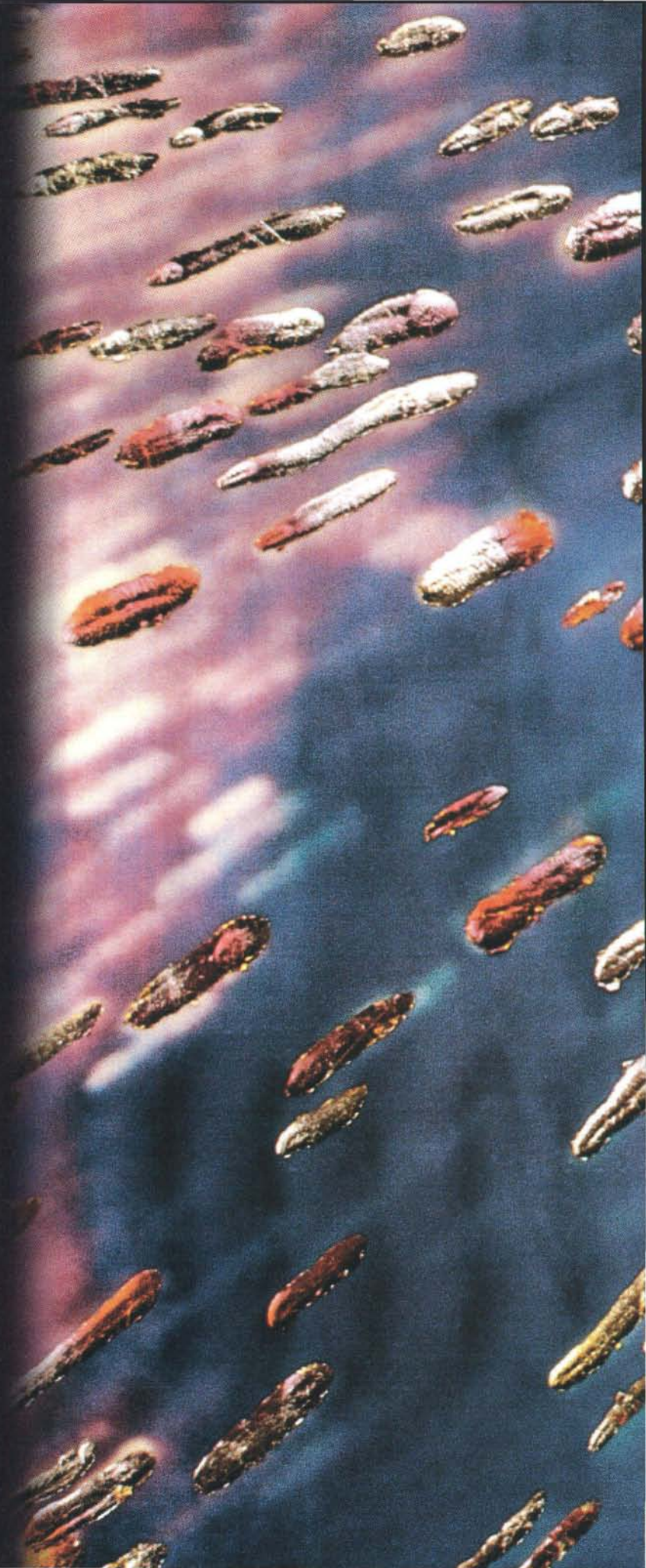
Another time we got a dune buggy because I wanted one like the one in *The Thomas Crown Affair*. The poor dune buggy didn’t last very long even though we found a friendly repairman. And just a month ago, Ann and I were in North Carolina trying to set a new world record for the number of putt-putt golfing rounds played in two hours. Many of these memories are hard to convey in email, I’m afraid. ■ ■ ■



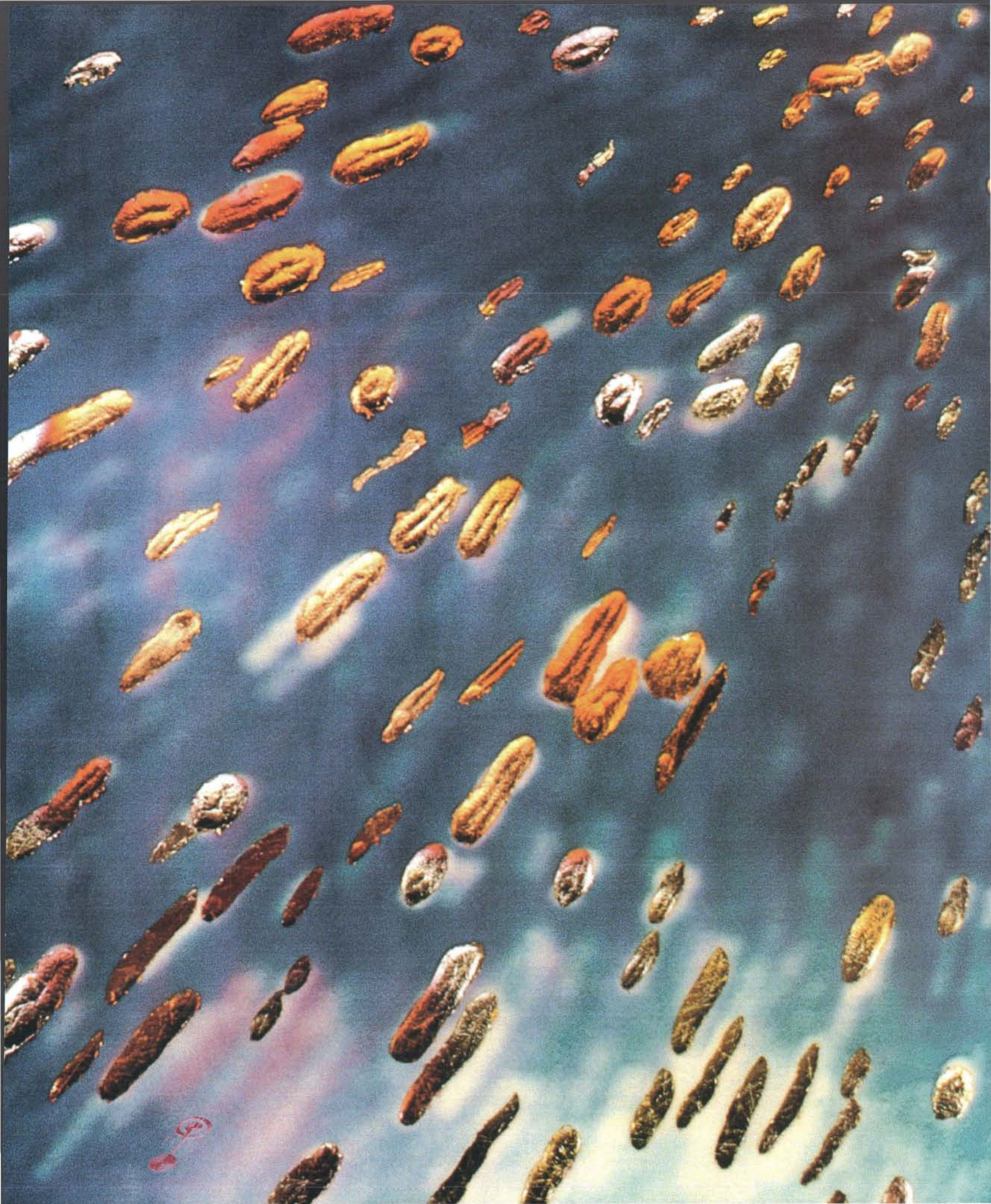
## Stardust

In his childhood dreams, Victor Raphael was a rocket man, floating through the asteroid belt, far above the world. He never did set foot in the great beyond, but Raphael has finally reached the stars with *Space Field*, a series of Iris prints and Quick-Time VR movies. Layering gold, silver, and copper leaf onto Polaroids of video footage, he produces digital images that are part meteor shower, part microscopic stampede. Step into his universe at [zzyzxworld.com/victor.html](http://zzyzxworld.com/victor.html), or contact Muse X Editions at +1 (213) 874 6141.  
— William O. Goggins

William O. Goggins ([bill@wired.com](mailto:bill@wired.com)) is staff editor at Wired.











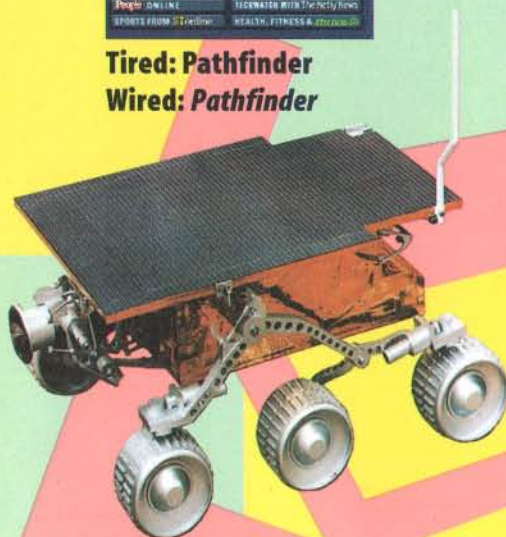
It started out an afterthought, an office joke as we closed our first issue. It's since snuck  
We figure anything worth doing is worth doing to excess, so here's **the Tired**

Edited by Jessie Scanlon

[www.wired.com/4.09/tiredwired100/](http://www.wired.com/4.09/tiredwired100/)



**Tired:** Pathfinder  
**Wired:** Pathfinder



"Fly-bys and orbiters are the easy stuff. Nothing is as hard as landing." So says Brian Muirhead, the spacecraft manager of the Mars *Pathfinder* project. And landing is exactly what *Pathfinder* will do.

The US\$170 million spacecraft and its \$20 million passenger – a six-wheeled robotic rover – should reach the red planet on the Fourth of July, 1997. Once the craft touches Martian dirt, the rover – powered by a single solar panel with battery backup and remotely controlled by an earthbound human "driver" – will roam the surface for seven days, collecting data on the atmosphere, rocks, and soil, and transmitting images of the red giant back to NASA – and to the Web.

**Tired:** Sonny Bono

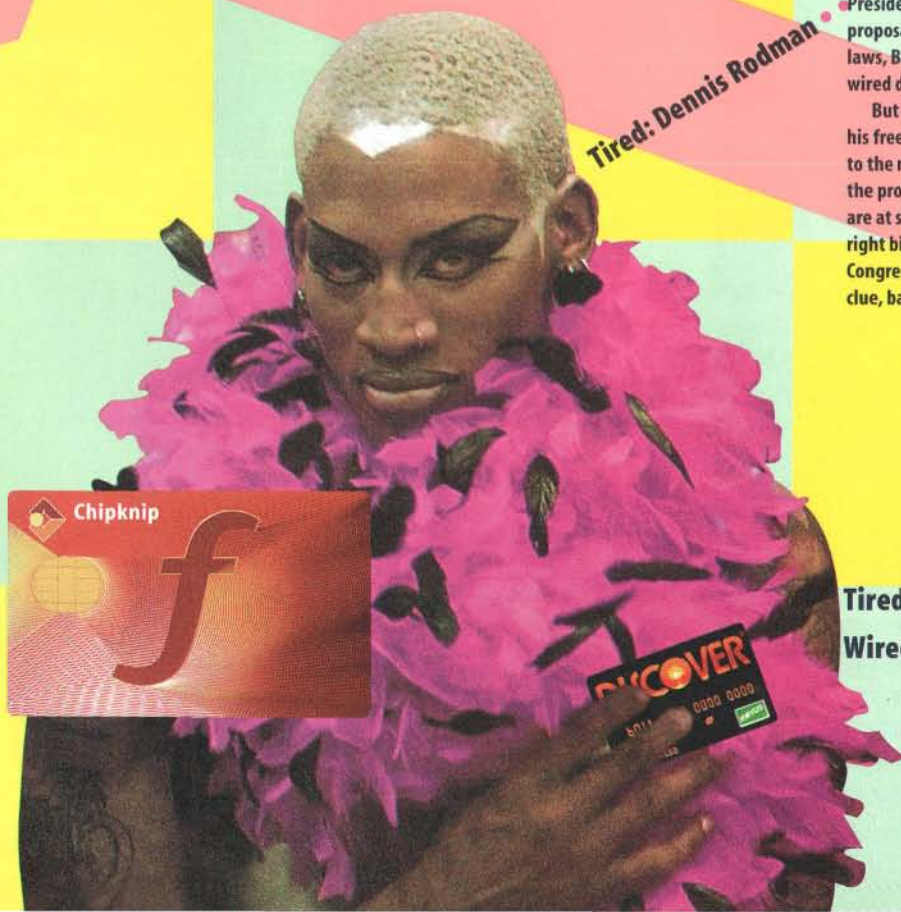


**Wired:** Sonny Bono

More US Representatives will learn a thing or two about data encryption when they realize it could help them hide illegal campaign contributions. For the moment, however, a scant few solons know anything about the subject – and Palm Springs, California, Republican Sonny Bono is among them. One of only 27 House members to sign a letter demanding that President Clinton drop his key escrow proposal and liberalize encryption laws, Bono proved himself to be one wired dude.

But Bono's plenty willing to chuck his free-market principles and revert to the role of Hollywood pimp when the profits of his entertainment pals are at stake. Case in point: the copyright bill worming its way through Congress with Bono's backing. Get a clue, babe.

**Tired:** Dennis Rodman



**Tired:** Discover card  
**Wired:** Chipknip card



**Tired:** Shrink-wrap

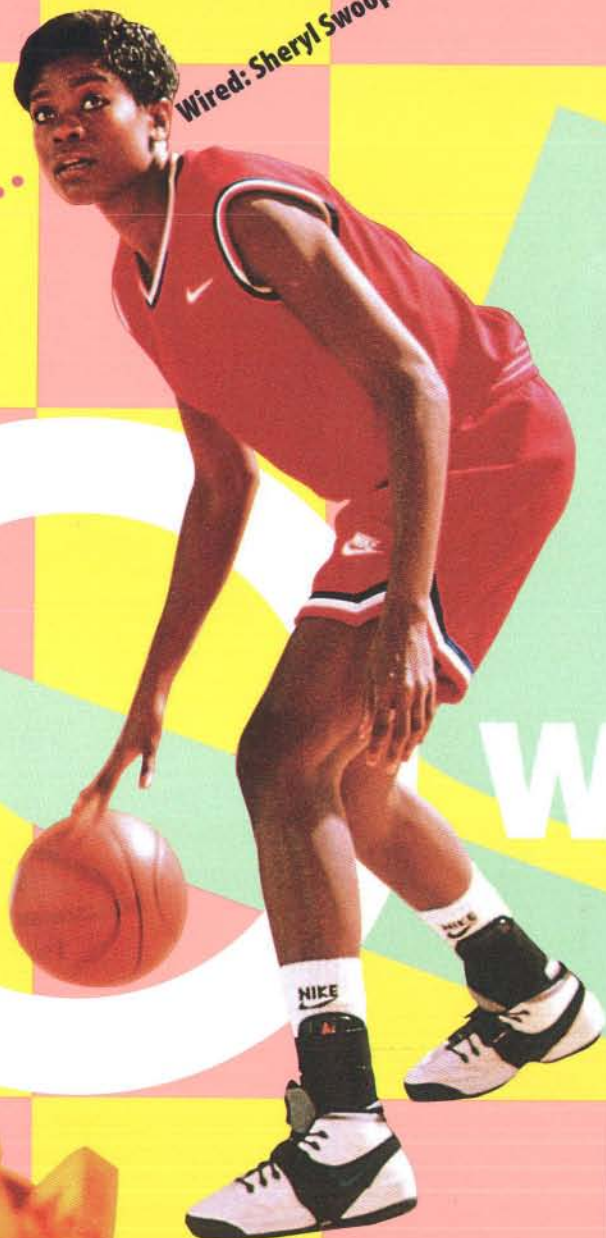
# TIRED



up and become a signature feature, and perhaps (sometimes hopefully) the most controversial thing we do.

**Wired list on steroids.** We hope you love/hate it as much as we did making it. 

Wired: Sheryl Swoopes



**Bugs. Big Bugs. Ants. Insektors.** Insects are the icky-cool creatures du jour in Hollywood. Fox, Pixar/Disney, and DreamWorks SKG all have buggy projects in the works. But the coolest, loudest buzz centers around the avant French animation studio Fantôme, whose eco-conscious six-legged saga *Insektors* boasts some of the most eye-catching computer-generated cartoonery ever seen. Its fantastical species of heroic space-bugs must battle their evil strip-mining cousins.

Meanwhile, although some studios are plodding down the prehistoric trail — *The Lost World*, Universal's sequel to *Jurassic Park*, and Sony's *Dinotopia* are about to hit the screens — velociraptors are stale and T-rex's are tired. Hell, dinosaurs are extinct.

Tired: Velociraptors  
Wired: Insektors



# WIRED

Say what you will about the know-nothings who voted for the Communications Decency Act and the pandering president who signed it into law. Judge Stewart Dalzell, on the other hand, has renewed our faith in the wisdom of the judiciary.

Writing for a Philadelphia federal court on June 11, Dalzell issued a stinging rebuke to Attorney General Janet Reno and her lackeys at the Department of Justice, who fought tooth-and-nail to defend the CDA. "The government's asserted 'failure' of the Internet rests on the implicit premise that too much speech occurs in that medium," Dalzell writes.

"This argument is profoundly repugnant to First Amendment principles."

Dalzell argues that "as the most participatory form of mass speech yet developed, the Internet deserves the highest protection from government intrusion." We couldn't have said it better ourselves.

Tired: Janet Reno



Wired: Stewart Dalzell

Wired: Download

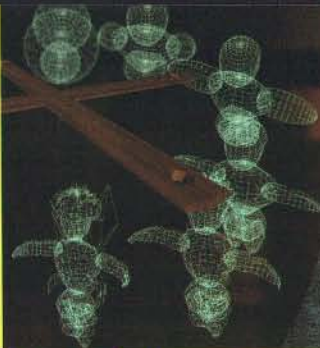
Image credits appear on page 234.



## Tired: Modeling avatars



## Wired: Breeding avatars



Now *this* is net.sex: breeding avatars. Using genetic algorithms to mate, mutate, and procreate these pixelized sprites of the metaworlds.

At Construct, an Internet design firm in San Francisco, Mark Meadows and his team want to harness nature's creative engine, so they're hacking out code that will help them evolve, through genetic selection, uniquely bizarre avatars for their clients' VRML Web sites. Insectile animals with brutish snouts that move in froglike leaps. Three-eyed critters that roll through the surreal rendered landscapes of cyberspace. Although Construct's codes are still experimental, the promise of genetic algorithms is captivating. As Meadows says, "GAs will take us past the limits of our imagination."



## Indian software

## Acid jazz

## Polygons

## Newton

## Court system

## Firewalls

## Serial killer movies



## Israeli software

## Classic jazz

## Voxels

## Pilot

## Virtual Magistrate Project

## Secure networks

## Natural disaster movies



## Tired: NSA

## Wired: Eli Biham



Eli Biham is the rising star of the crypto community. A deeply technical, highly cautious researcher at Israel's prestigious Technion institute, Biham is best known for co-developing differential cryptanalysis – the first working attack against the National Security Agency's beloved Data Encryption Standard.

Now, after years spent making encryption algorithms stronger, the code whiz is making them faster. Biham co-developed a hash function called Tiger, a cryptological checksum that computes quicker than Ron Rivest's MD5 algorithm (and is more secure as well).

Test-drive the crypto fast lane at his Fast Software Encryption Workshop this January in Haifa, Israel. But don't forget your seat belt.

## Tired: Doom



*Duke Nukem 3D* is an over-the-top splatterfest. It's *Doom* with a sense of humor. And more violence.

Level I is set in a hostile, mutated post-nuclear-holocaust Los Angeles, in which you battle piglike police officers, gun down aliens in the 7-Eleven, and use grenades to blast out the doors of the local porno theater (you can even catch a flick while you're there). Level II is ... well, you have to get there to find out.

Nothing like a shoot-'em-up that refuses to take itself seriously.

## Wired: *Duke Nukem 3D*







**Tired:** Bigfoot  
**Wired:** La Chupacabra

**Tired:** Jolt  
**Wired:** Water Joe



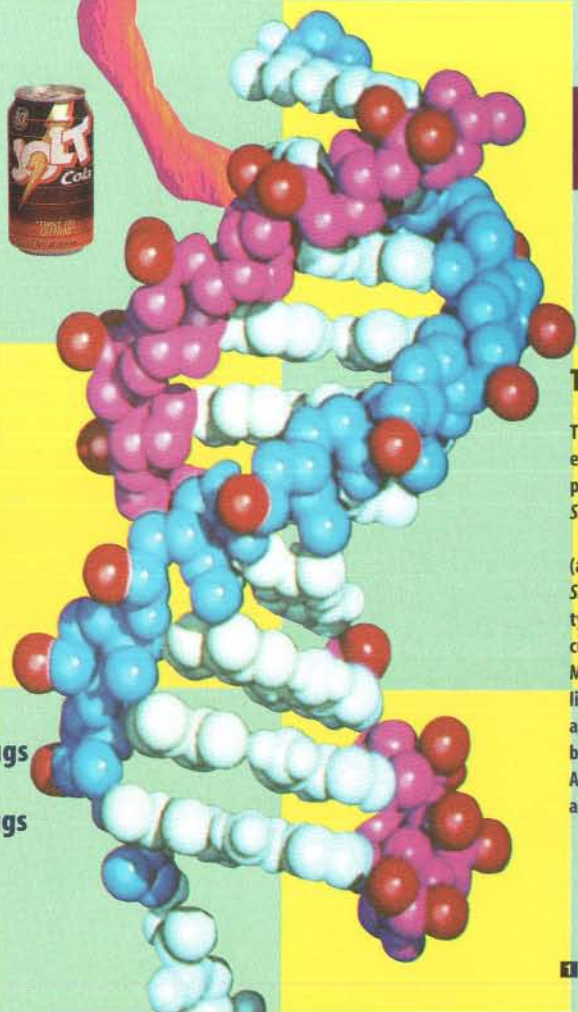
**Tired:** MTV  
**Wired:** The History Channel



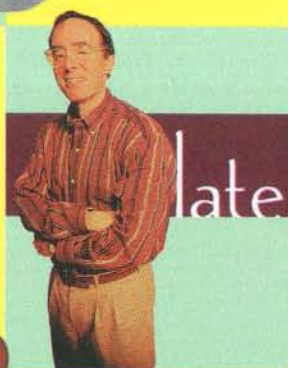
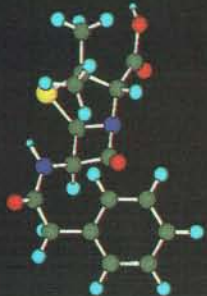
**Tired:** Matt Mahurin  
**Wired:** James Porto



**Tired:** Laika & The Cosmonauts  
**Wired:** Laika



**Tired:** Antibiotic drugs  
**Wired:** Antisense drugs



**Tired:** Slate

The wonderboy of the old-media establishment, Michael Kinsley prattles on about the radical chic of *Slate*, his groundbreaking über-rag.

Reeking of cutesy analog nostalgia (a paper version is also available), *Slate* may goad a few toffee-nosed lit types to dip their pinkies in Third Wave culture. But to everyone else, this Microsoft-subsidized diva looks more like a newsletter in digital drag, not a publication that understands the benefits and limitations of the medium. Another day, another revolution to appropriate.

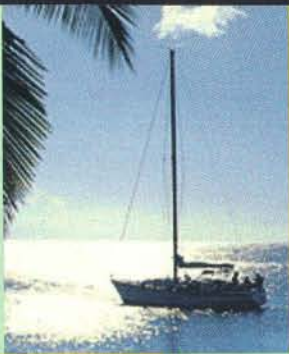


**Wired:** Feed

The MTV-meets-Dostoyevsky *Feed* doesn't rely on old publishing blueprints. Eschewing more-wired-than-thou scare tactics, overhyped graphics, and delirious future-fucking, editors Steven Johnson and Stefanie Syman are producing a Net publication that successfully exploits the possibilities of new media.

While so many webzines roll out the interactive carpet, few are home when you click on the door. Not so with *Feed*, which Johnson describes as "50 percent magazine and 50 percent BBS-style community."





**Tired: Offshore banking**  
**Wired: Offshore homesteading**

Call it living in the laptop of luxury. A small but growing class of technosavants are fabricating virtual identities, telecommuting to work, and banking online – while their physical beings sail through international waters or reside in a Caribbean tax haven. Offshore homesteading means no taxes, no pesky local censorship, no anti-encryption laws. Just home sweet homepage.



**Tired: Steve Case, AOL**  
**Wired: Dan Case, H&Q**

You've got to give Steve Case some credit. He took ideas that seemed rehashed from a junior-level Procter & Gamble product manager's playbook and turned them into an online service somewhat more exciting than Charmin toilet paper.

And it *has* been a good ride. When we counted the fun things Case has given us, we needed two hands: 1) the Gap ads; 2) dissing Netscape with the Microsoft preferred-browser deal; 3) cheesy email to subscribers every month; 4) Ted Leonsis in a leadership role; 5) alt.aol-sucks; and, let us not forget, 6) "You've got mail."

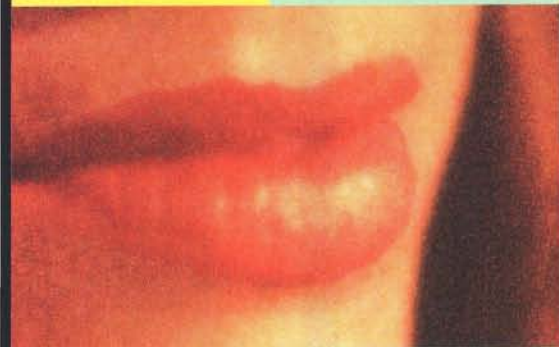
Sorry, Steve, but your 15 minutes are up. Of course, you'll be charged for 17.



**Tired: MicroTAC**  
**Wired: StarTAC**



**Tired: High bandwidth**  
**Wired: Low latency**



**Tired: Sandra Bullock**



**Tired: Diamanda Galás**

The music of ghosts, of the wind, of spirits far from our material world: the buzzing, croaking timbre of *khoomi*, or throat-singing, originates from northern Mongolia. Using epiglottal and harmonic manipulation and circular breathing, *khoomi* practitioners produce simultaneous two- and three-tone warbles, sounds that evoke both a tin whistle and a didgeridoo, haunting atonal melodies that float like clouds and chill listeners with their beauty.

**Wired: Tuvan throat-singing**



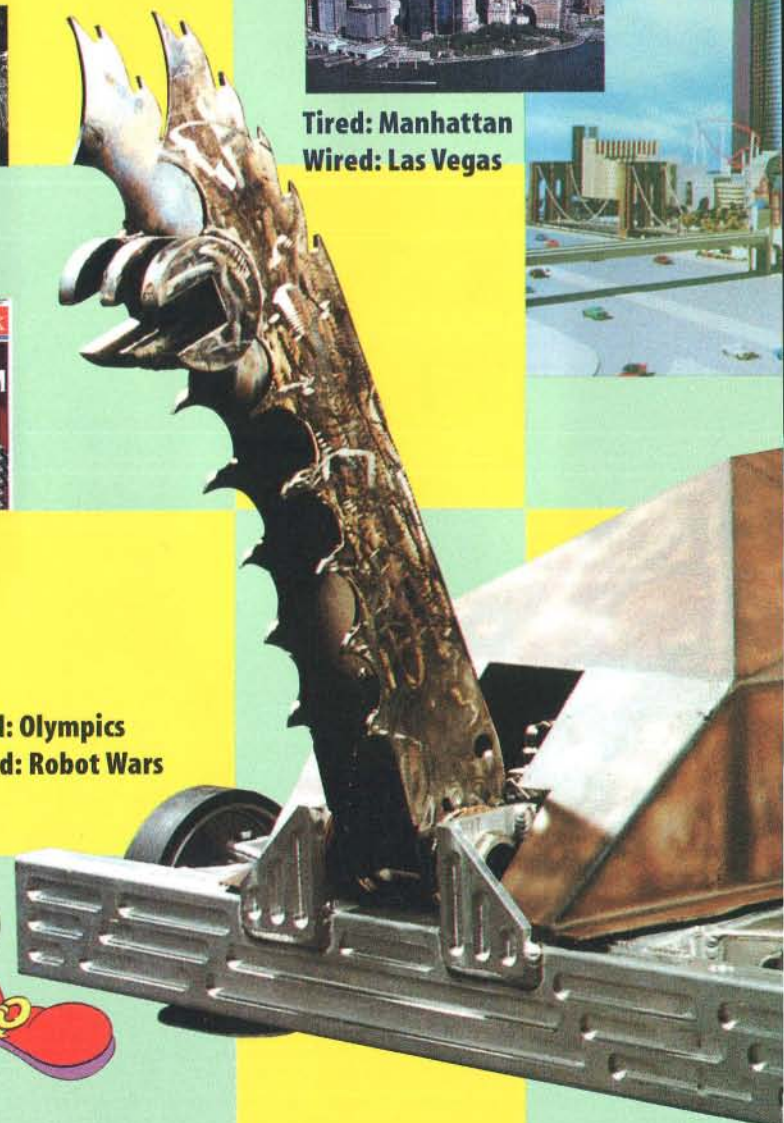
**Tired: Goth**  
**Wired: Swing**



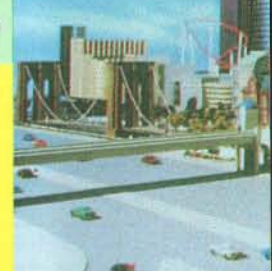
**Tired: The Red Herring**  
**Wired: Business Week**



**Tired: Olympics**  
**Wired: Robot Wars**



**Tired: Manhattan**  
**Wired: Las Vegas**







**ATM**

**National Education  
Association**

**K. W. Jeter**

**MD5**

**Consultants**

**PictureTel**



**Gigabit Ethernet**

**Edison Project**

**P. K. Dick**

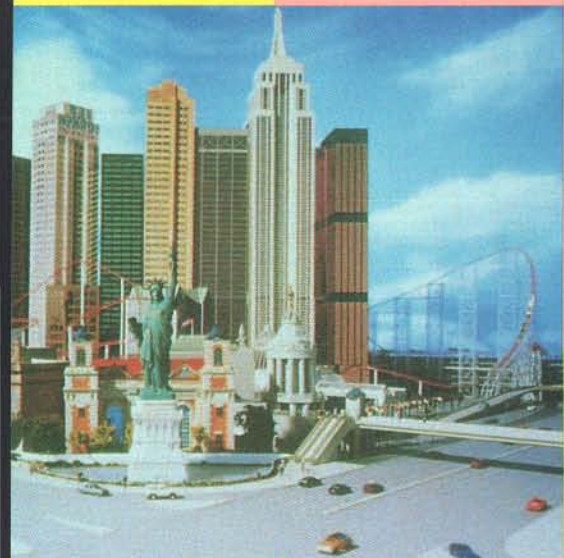
**SHA-1**

**Permalancers**

**VDOnet**



**Tired:**  
**John Dvorak**  
**Wired:**  
**Ned Brainard**



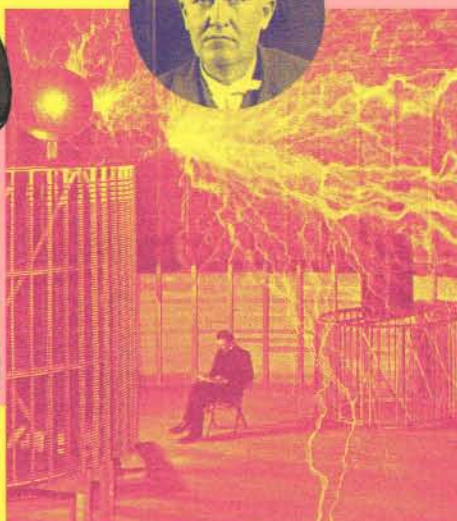
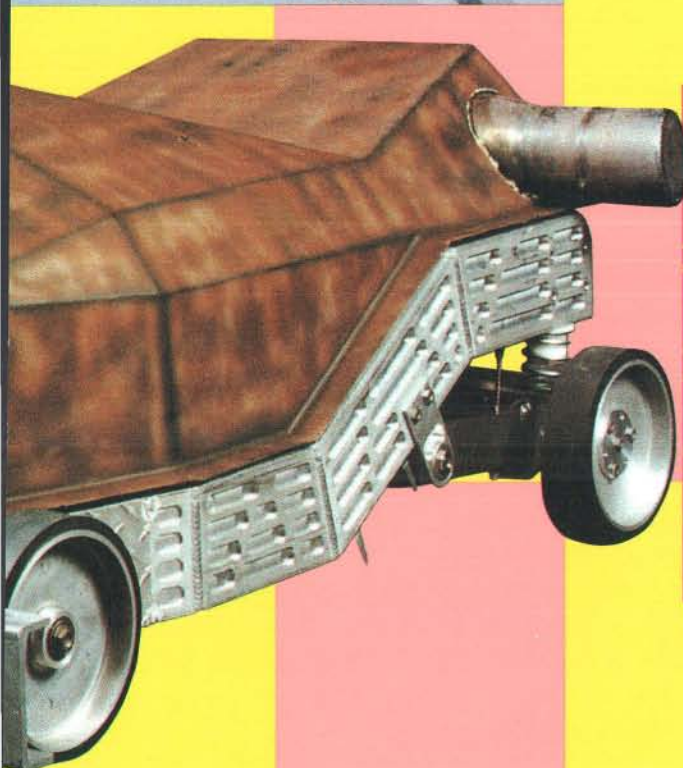
**Tired: Nickelodeon**  
**Wired: Spike & Mike's  
Festival of Animation**

Spike & Mike's Festival of Animation is a traveling showcase of international work, ranging from Nick Park's warmly expressive Claymation characters to Chris Landreth and Robin Bargar's "The End," whose wispy flowing figures break away from the cold, toyish images of standard computer-generated work.

The most hysterically gross shorts are screened in the lowbrow "Sick and Twisted" program, a breeding ground for young, offbeat talent.



**Wired: Liv Tyler**



**Tired: Thomas Edison**  
**Wired: Nikola Tesla**

**Tired: Marvel and DC comics**  
**Wired: Fantagraphics**

The tiny Seattle-based Fantagraphics puts out the best comic books in the world, including the work of Dan Clowes, Jim Woodring, and the incredible Chris Ware, creator of *The ACME Novelty Library*.

Looking like a souvenir program plucked from a 1939 time capsule, *ACME* features the hallucinatory episodes of Jimmy Corrigan, a sad-sack geezer who sits in his lonely room, taking calls from his mother while fractured childhood recollections play in his head. Let 'em roll.







**Tired:**  
Mind Extension  
University



**Wired:**  
Professor  
Norman Coombs

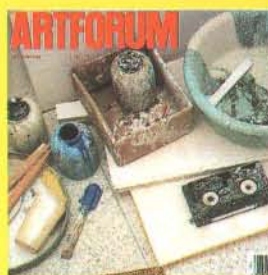
**Tired:** GPS

At an age when many men are sauntering around golf courses in plaid slacks, Norman Coombs still labors in a dimly lit office poring over the fractured prose of college students. The 64-year-old teaches history at the Rochester Institute of Technology. So? For one thing, his classes meet online. For another, the man is blind – he uses sophisticated speech-output technology to lead text-based conversations. And the digital format allows the smattering of deaf students in the class to participate equally.

Coombs tells one of those stories about how the personal computer “changed my life.” And it did. For years, the prof paid people to read to him. Now a palm-sized speech synthesizer stuck to the side of his terminal monitors the virtual classroom discussions and “reads” the messages and term papers that his students submit electronically. “For the first time,” he says, “being blind is irrelevant.” For his students, so is being deaf. Being dumb – well, that’s another story.

**Tired:**  
Dole,  
Clinton,  
et alia

**Wired:**  
None of the  
above

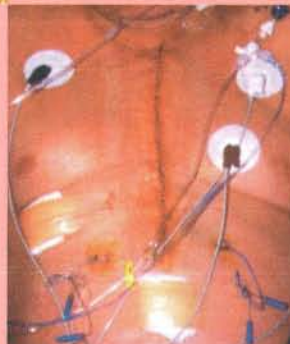


**Tired:** Artforum



**Wired:** World Art

While most art mags cover the dead and the nearly dead of the art establishment, *World Art* plays with high-voltage wires in the rain. Its scope is truly worldly: from Japanimation to William S. Burroughs’s shotgun paintings to tech-installation artist Teiji Furuhashi. The publication celebrates high art and low art in vibrant, stunning spreads, interspersed with the iconoclastic voices of Jean Baudrillard and David Byrne. It deflates the myths of ’80s coverboys Julian Schnabel and Jeff Koons. It digs out new artists playing with new media. Young and experimental, *this* is the art forum to be in.



**Tired:**  
Open heart surgery



**Wired:**  
Heart port surgery

**Wired:** GLONASS

If it’s accuracy you want, you have to go to the Russkies – the US government intentionally cripples its Global Positioning System technology for civilian use. The US policy of Selective Availability, an official mandate that injects a random clock error into all GPS data, means the masses receive less reliable readouts than the brass does. Commercial GPS receivers can be off by as much as 100 meters.

Developed by the Russian Ministry of Defense, the Global Navigation Satellite System ([satnav.atc.ll.mit.edu/](http://satnav.atc.ll.mit.edu/)), or GLONASS, provides location on demand – without Uncle Sam’s signal degradation.

A recent White House decree promised to revisit the issue of Selective Availability by 2000. Until then, find yourself with GLONASS.



**Tired:**  
Rocket Science

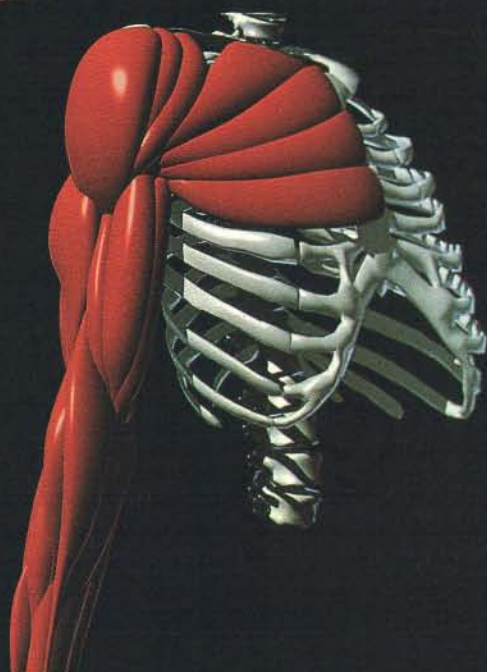
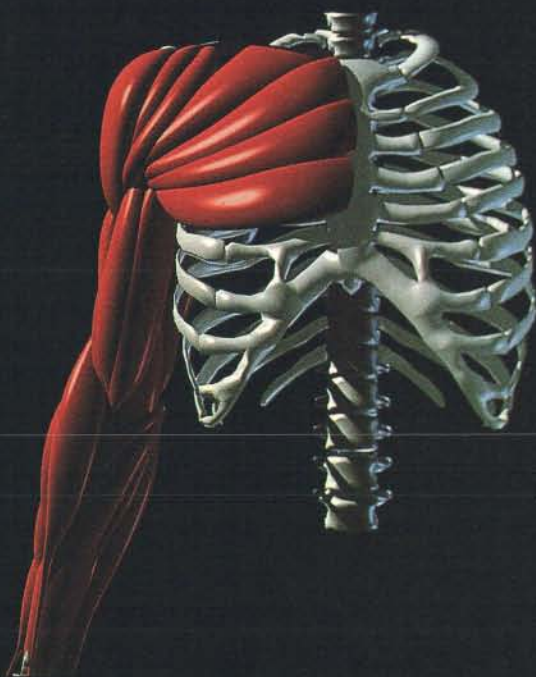
**Wired:**  
DreamWorks SKG Interactive



**Tired:**  
DreamWorks SKG

**Wired:**  
Behaviour





**Class-action suits**

**DKNY**

**Cynicism**

**Enhanced CDs**

**Blaming your parents**



**Tort reform**

**26 Red**

**Optimism**

**7-inch records**

**Blaming the government**

Even fellow hackers think Henry Massalin is odd. Like all nerdy eccentrics, Massalin obsesses: stuffed koala bears, piggyback rides (his passenger log includes Marvin Minsky and Penn & Teller), and, of course, computers.

Ten years ago, when operating systems were a "dead" research area, Massalin developed an OS kernel known as Synthesis which, running on the experimental Quamachine, was orders of magnitude faster than traditional systems — as in, real-time audio and video processing. In 1986! Now he works on really fast digital signal processors at MicroUnity Systems Engineering.

When Massalin starts talking code synthesis and theoretical DSP functions, the poster-boy hackers are left to jacuzzi with the press and write sensationalist crime books.



**Tired:**  
Tsutomu Shimomura



**Wired:**  
Henry Massalin



**Tired: Motion capture**  
**Wired: Synthespians**

Casper generated more than US\$280 million in worldwide sales. But the friendly computer-generated ghost didn't impress the folks at Digital Domain, who are obsessed with the challenge of animating realistic human characters — synthespians — and weary of standard motion-capture techniques. Which is why the team at this special effects house is developing the Human Animation Research and Development project.

Programmed with data on skeletal structure, muscle systems, joints, and body mechanics, HARD drives digital actors from the inside out. The software knows the human body better than the animators do. Say, for instance, the Domainers want to digitally create an ambulatory Arnold Schwarzenegger. When his foot hits the ground, the computer knows exactly which leg muscles will bulge and animates accordingly. The result is infinitely more realistic than images produced with motion-capture technology.

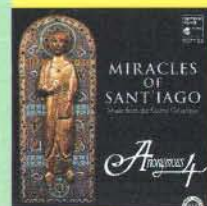
HARD still can't give a bonehead actor smarts — but it's a smart way to make an animated musclem.



**Tired: PowerBook**  
**Wired: ThinkPad 560**



**Tired:**  
**Three Tenors**



**Wired:**  
**Anonymous 4**

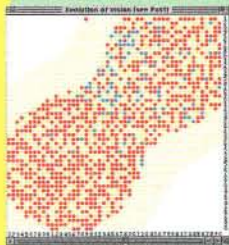
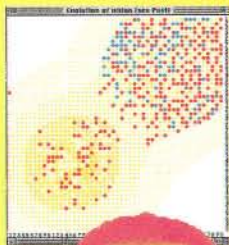
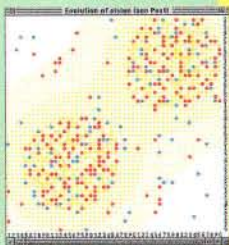


**Tired: Waldenbooks**  
**Wired: Amazon.com**



**Tired: Web sites based on TV shows**  
**Wired: TV shows based on Web sites**





### Tired: Robert Reich

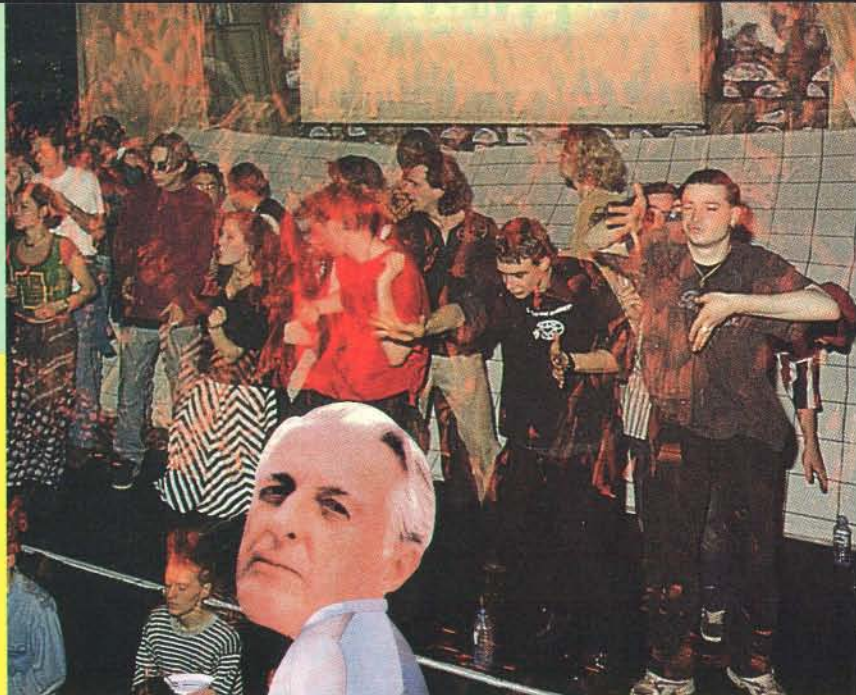
Downsizing. Corporate re-engineering. Minimum-wage law. Welfare as we know it. Serious issues loom on the labor policy horizon. Meanwhile, Robert Reich, the US Secretary of Labor and a respected economist, is putting our tax dollars to work by writing articles for *GQ* on "Living Large in a Downsized World." Thanks for the analysis. And by the way, Bob – you're fired.



### Wired: Robert Axtell and Joshua Epstein

Wave goodbye to the invisible hand of classical economics. Through computer simulation, Robert Axtell and Joshua Epstein – two Brookings Institution researchers – have revealed the dynamic and often irrational nature of the economy. Their animated artificial world Sugarscape demonstrates the influence of social behavior on economics – and vice versa.

The simulation begins with a population of agents and a small distribution of one natural resource – sugar. Then tribes and cultures develop. Trade wars occur. Wealth distribution is skewed. Society is destroyed by overpopulation. Then what? Restart the simulation to witness another possible history. Just try that, Mr. Reich.



### Tired: After hours Wired: Cocktail hour



### Tired: Gender bending



### Wired: Gender hacking

### Tired: Intranets



### Wired: Internet



### Tired: Investing in online Wired: Online investing



### Tired: Hollywood



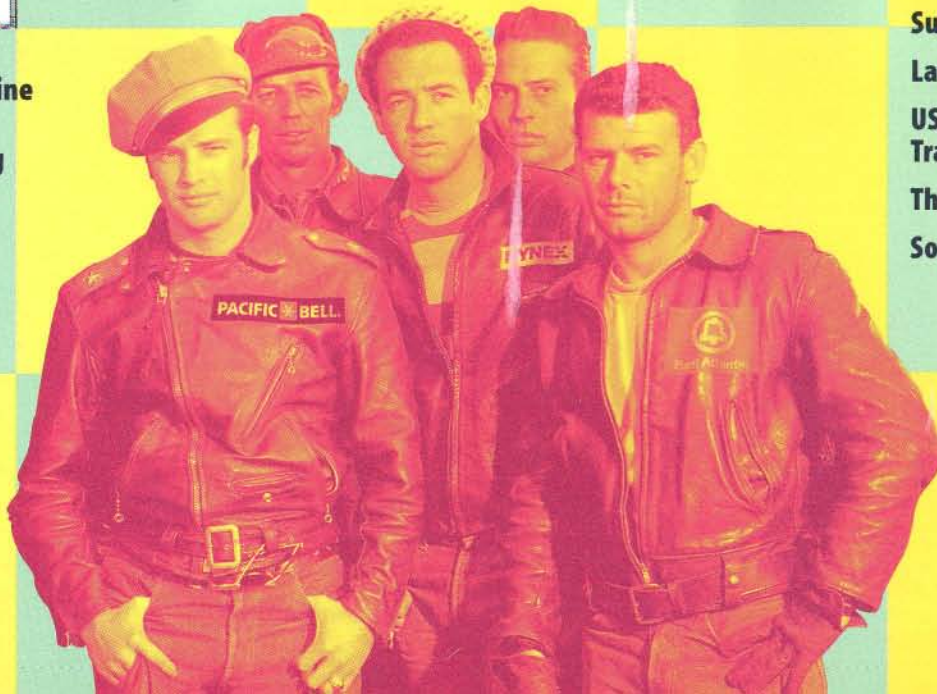
### Wired: Hong Kong



Sub Pop  
Lawsuits  
US Patent and Trademark Office  
Third parties  
Social Security



Sub Rosa  
Leisure suits  
Internet Patent News Service  
Triple DES  
Social Security privatization



### Tired: Baby Bells Wired: Teen Bells





## Tired: Banner ads

If there were a Webster's dictionary, the definition of *never* would be "the last time you clicked on a banner ad."

Sure, online advertising revenue is surging, but clickthroughs on those blue-bordered rectangles are as rare as funny jokes in rec.humor. And now troublemakers such as PrivNet are



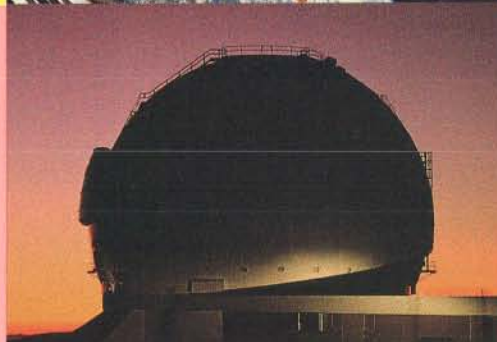
offering free software that selectively blocks ads, graphics, and cookies.

To keep cash flowing in their direction, content developers have performed a global search and replace on their business plans, supplanting banner ads with *sponsorships*. The buzzword can mean anything from cobranded content to advertorial to outright whoring.

## Tired: Al Gore Wired: Conrad Burns

Montana's Stetson senator, Conrad Burns, is wearing a virtual white hat — and aiming a legislative silver bullet at the heart of the Clinton administration's Cold War-era export restrictions on encryption products. The Promotion of Commerce Online in the Digital Era Act of 1996 — dubbed Pro-CODE — also ensures the right to use private (non-government-made) crypto products.

This blunt-bordering-on-crass US senator has always been at the forefront of congressional telecommunications efforts, seeking to ensure that rural areas aren't treated like bastard step-children on issues of equal access. Now with crypto on his plate, Burns is on a cyber road show, reaching out to a new constituency: netizens. But he still calls it as he sees it and doesn't much care about the fallout.



## Tired: Orbital telescopes Wired: Active-optics telescopes

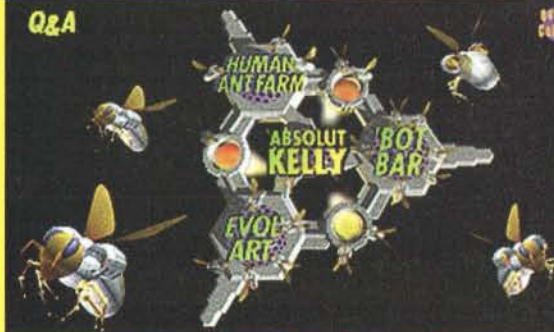
Souped up with active-optics technology, an earthbound telescope can snap intergalactic infrared images almost as clear as those taken from orbit — without the hassle of going there. The advanced optical system and sophisticated wavefront sensors inside these scopes instruct the ultra-low-expansion glass mirrors to constantly deform themselves in real time, counterbalancing distortions in the image produced by the atmosphere or wind shake. This clever control system will be used in the two new 8-meter Gemini telescopes, one of which will gaze at the heavens from Mauna Kea, Hawaii, the other from Cerro Pachón, Chile. With these twin scopes set for duty by 2001, astronomers will have the entire sky covered.

## Tired: Moore's Law<sup>1</sup>



## Wired: Moore's Second Law<sup>2</sup>

## Q&A



## Wired: Sponsorships



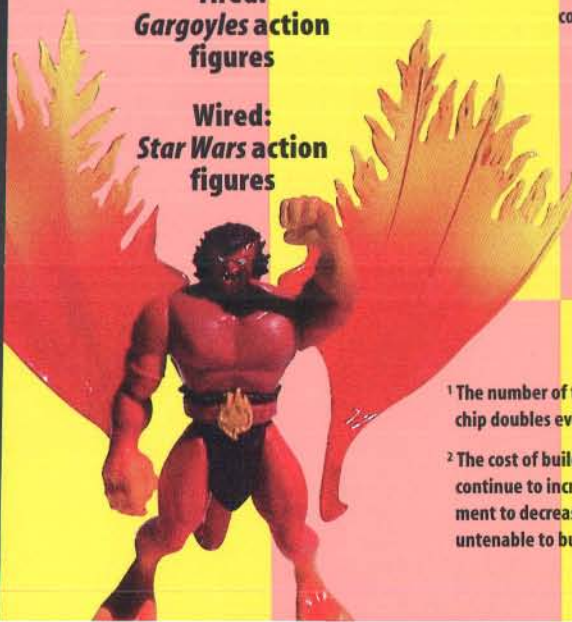
## Tired: Parenting



## Wired: hip Mama

## Tired: Gargoyles action figures

## Wired: Star Wars action figures



## Tired: Drug wars Wired: Drug reform

<sup>1</sup> The number of transistors on a silicon chip doubles every 18 months.

<sup>2</sup> The cost of building chip fabrication plants will continue to increase (and the return on investment to decrease) until it becomes fiscally untenable to build new plants.





**Tired:**  
Ralph Nader

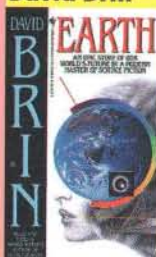


**Wired:**  
*Consumer Reports*

Greg Egan is the hottest export Australian science fiction has ever seen. This isn't pop sci-fi for Joe Sixpack and Susie Housecoat – this is the hard stuff: complex, brittle, dark, and sticky. The greatest master of the “ontological riff” since Philip K. Dick, Egan meditatively chews the broken glass of quantum physics, computer simulation, digital solipsism, and the mathematics of consciousness.

This 35-year-old mathematician, failed surrealist filmmaker, and longtime computer programmer likes his protagonists gritty, gloomy, and filled with deep, inextricable states of shattering paranormal angst. Watch for his forthcoming novel, *Distress*.

**Tired:**  
David Brin



**Wired:**  
Greg Egan



**Diminishing returns**  
Family Research Council

Jean-Paul Gaultier  
Gallium arsenide  
Inner-city TV



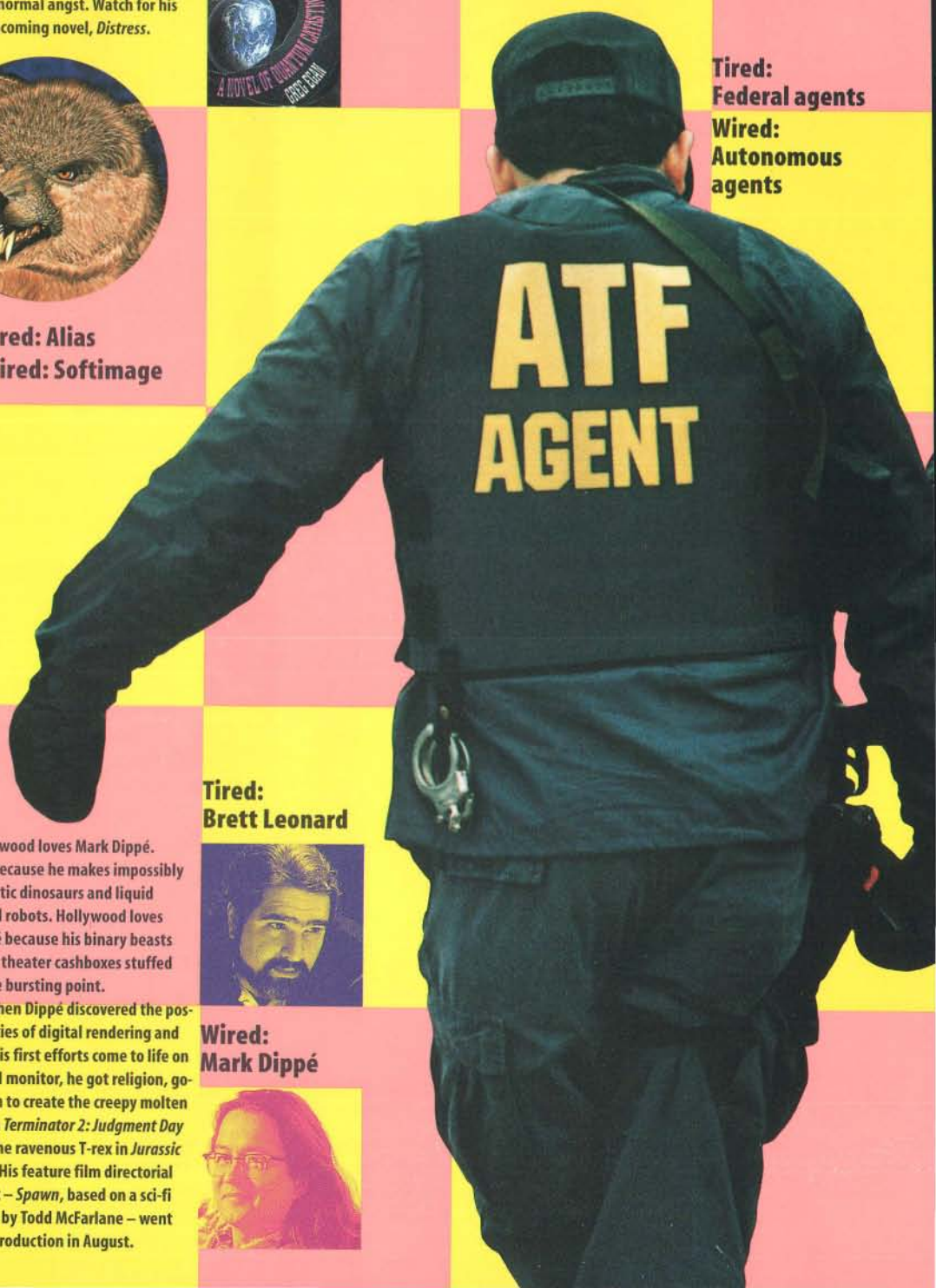
**Exponential growth**  
National Research Council

Jhane Barnes  
Silicon germanium  
Outer-space TV



**Tired:** Alias  
**Wired:** Softimage

**Tired:** Federal agents  
**Wired:** Autonomous agents



Santiago Calatrava's constructions evoke organic life, with rhythmic ribcages, arching spines, compact joints, and tensile ligaments. These osteomorphic analogies animate the work of this Spanish engineer and architect, setting it apart structurally and sculpturally. His dynamic designs for bridges, museums, and sculptures seem poised for flight, caught in tense, temporary flex, or on the verge of collapse, with towers that lean into space, frozen in inexplicable equilibrium. Calatrava solves complex engineering problems with an architect's sensitivity for space and site, a sculptor's sense of form and material.

**Tired:**  
Michael Graves



**Wired:**  
Santiago Calatrava



**Tired:**  
Brett Leonard



**Wired:**  
Mark Dippé



Hollywood loves Mark Dippé. Not because he makes impossibly realistic dinosaurs and liquid metal robots. Hollywood loves Dippé because his binary beasts leave theater cashboxes stuffed to the bursting point.

When Dippé discovered the possibilities of digital rendering and saw his first efforts come to life on an SGI monitor, he got religion, going on to create the creepy molten cop in *Terminator 2: Judgment Day* and the ravenous T-rex in *Jurassic Park*. His feature film directorial debut – *Spawn*, based on a sci-fi comic by Todd McFarlane – went into production in August.



**Tired: Wet chemistry**



**Wired: Dry chemistry**

Brains are better than sludge. That's the idea behind rational-based drug discovery – a “dry” chemistry in which scientists search databases of chemical compounds for specific molecular structures or behaviors and then assemble new compounds, Tinkertoy style, using computer modeling.

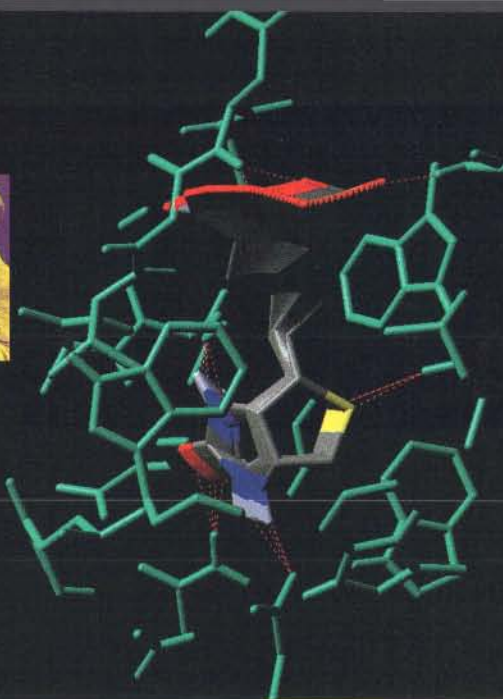
In the sludge-based process, chemists spend years blindly testing assays – mixtures of organic compounds – and waiting for a reaction, any reaction, that could lead to a drug. It's hit or miss, but mostly miss.

Now, once a compound has been targeted in the “wet” lab, scientists can use a computational approach to identify promising directions for further research – and dramatically increase the number of hits per miss.



**Tired: PriceCostco  
Wired: CUC International**

**Tired: Optical lithography  
Wired: Extreme ultraviolet lithography**



**Tired: Ken Auletta**



**Wired: Dave Farber**

Dave Farber is a computer scientist, a cyber activist, and a gadget hound. More than that, he is the interesting person – the man behind the Interesting People mailing list. (Email [farber@cis.upenn.edu](mailto:farber@cis.upenn.edu) to subscribe.)

Some 25,000 readers swear by the University of Pennsylvania prof's daily messages: an update on telecom policy or a giddy rave about his newest digital gizmo or a diary of his recent conference junket.

The Net has enabled untold garrulous self-made pundits to broadcast their every thought.

But Farber breaks the mold.

He has the technical chops and the public spirit to be the Paul Revere of the Digital Revolution.



**Tired: PC**

**Wired: NC**

*Timothy has passed ...*

Pulse = 0  
ood Pressure = 0/  
says he's feeling

**Tired: Death of the Web**

**Wired: Death on the Web**

**Tired: Herbal ecstasy**



**Wired: Bathtub absinthe**

**Tired/Wired 100 Contributors:**

Erica Ackberg, Andrew Anker, Tim Barkow, Colin Berry, Jennifer Butler, Daniel Carter, John Couch, James Daly, Dennis Dimos, Paul Donald, Alex Frankel, Mark Frauenfelder, Jesse Freund, Simson Garfinkel, Cathy Ho, Amy Johns, Todd Lappin, Taylor McDowell, Brock N. Meeks, Russ Mitchell, Paula Parisi, John Plunkett, Andy Rozmiarek, Tessa Rumsey, Steve Speer, Erika Spence, Bruce Sterling.



**Wired: What do you mean by flow?**

**Csikszentmihályi:** Being completely involved in an activity for its own sake. The ego falls away. Time flies. Every action, movement, and thought follows inevitably from the previous one, like playing jazz. Your whole being is involved, and you're using your skills to the utmost.

**How can a Web site be designed to stimulate and sustain a flow experience?**

A Web site that promotes flow is like a gourmet meal. You start off with the appetizers, move on to the salads and entrées, and build toward dessert. Unfortunately, most sites are built like a cafeteria. You pick whatever you want. That sounds good at first, but soon it doesn't matter what you choose to do. Everything is bland and the same. Web site designers assume that the visitor already knows what to choose. That's not true. People enter Web sites hoping to be led somewhere, hoping for a payoff.

**So goals are important?**

Goals transform a random walk into a chase. You need clear goals that fit into a hierarchy, with little goals that build toward more meaningful, higher-level goals.

Here you are, tracking the footprints of some animal you haven't seen. That's exhilarating. Then there's the question of feedback. Most Web sites don't very much care what you do. It would be much better if they said: "You've made some interesting choices" or "You're developing a knowledge of Picasso." There's also the ability to challenge. Competition is an easy way to get into flow.

**Internet marketers embrace flow as the "glue that holds consumers in the online environment." Are people more easily influenced while in a state of flow?**

Actually, they're probably more critical. A flow experience has got to be challenging. Anything that is not up to par is going to be irritating or ignored.

**Your interest in flow came out of your work on the psychology of creativity. What advice do you have for online content creators who want to be more creative?**

Realize that change and downtime are important. I found that if a painter relates to objects only through vision, his work is much less original than a painter who walks up to the object, smells it, throws it in the air, and manipulates it. The variety of sensory inputs allows you to create a visual

image that has all kinds of dimensions bubbling up inside it. We are still a multimedia organism. If we want to push the envelope of complexity further, we have to use all of our devices for accessing information – not all of which are rational.

**Flow depends on the ability to engage in intense concentration. But media, like television, seem to be shortening our attention spans.**

It's true that some kids who have grown up on only television fare have ridiculously short attention spans. One problem television poses is that it doesn't provide children with the physical evidence of cause and effect. In olden times, if you didn't get up and out of bed at 5 a.m. to milk the cows, you knew those cows would soon start screaming. What you did had consequences. Now children are passive observers of information without any responsibility.

**Does the interactivity of the Net recapture part of that cause and effect?**

Yes, to the extent that you have to play by the rules and each move has a consequence. Still, it is a symbolic causal system, like playing chess, and it may present too narrow a set of consequences. Playing chess is not the whole world, and there are chess champions – like Bobby Fischer – who are absolute babies in terms of operating in society.

**In your book *The Evolving Self*, you wrote about promoting small social units, or cells, that would direct the course of evolution. Do you now see online communities filling that function?**

Possibly. The cells I wrote about would be made up of people in the same locale who share some common interests and concerns, which are easy to translate into commitment. On the other hand, online communities are easy to create, but they are also easy to ignore and drop out of. There has to be a common business interest or ideology before an online community can have much leverage.

**Will the Net be a tool for advancing the evolutionary goal of a more complex consciousness?**

The Net allows the easy exchange of information and the communication of values. But I'm still fighting the notion that the Net is really going to result in a more complex vision of reality. When things become too easy, they also end up becoming more sloppy. In the Middle Ages, for example, people were willing to walk from Stockholm to Munich to meet somebody who had something important to say. They listened and thought seriously about what they heard. Now, communication is instantaneous. I'm afraid after a while we may not pay much attention to it. The gates of attention allow very few things to come in. ■ ■ ■

*John Geirland (geirland@aol.com) is a writer and management consultant specializing in new media. He has a doctorate in social psychology.*

A compelling Web site transforms a random walk into an exhilarating chase. The key, says psychologist Mihály Csikszentmihályi, is a finely tuned sense of rhythm, involvement, and anticipation known as "flow." Csikszentmihályi (pronounced "CHICK-sent-me-high-ee"), a professor at the University of Chicago, has spent more than 25 years researching flow, a state of "intense emotional involvement" and timelessness that comes from immersive and challenging activities such as software coding or rock climbing. His work is studied by marketing specialists like Vanderbilt University's Donna Hoffman and Thomas Novak, who write that flow is "a central construct when considering consumer navigation on commercial Web sites." In books like *Creativity: Flow and the Psychology of Discovery and Invention*, Csikszentmihályi explores the implications of flow for personal and societal evolution.





According to

Mihály Csikszentmihályi,

# GO WITH THE FLOW

great Web sites

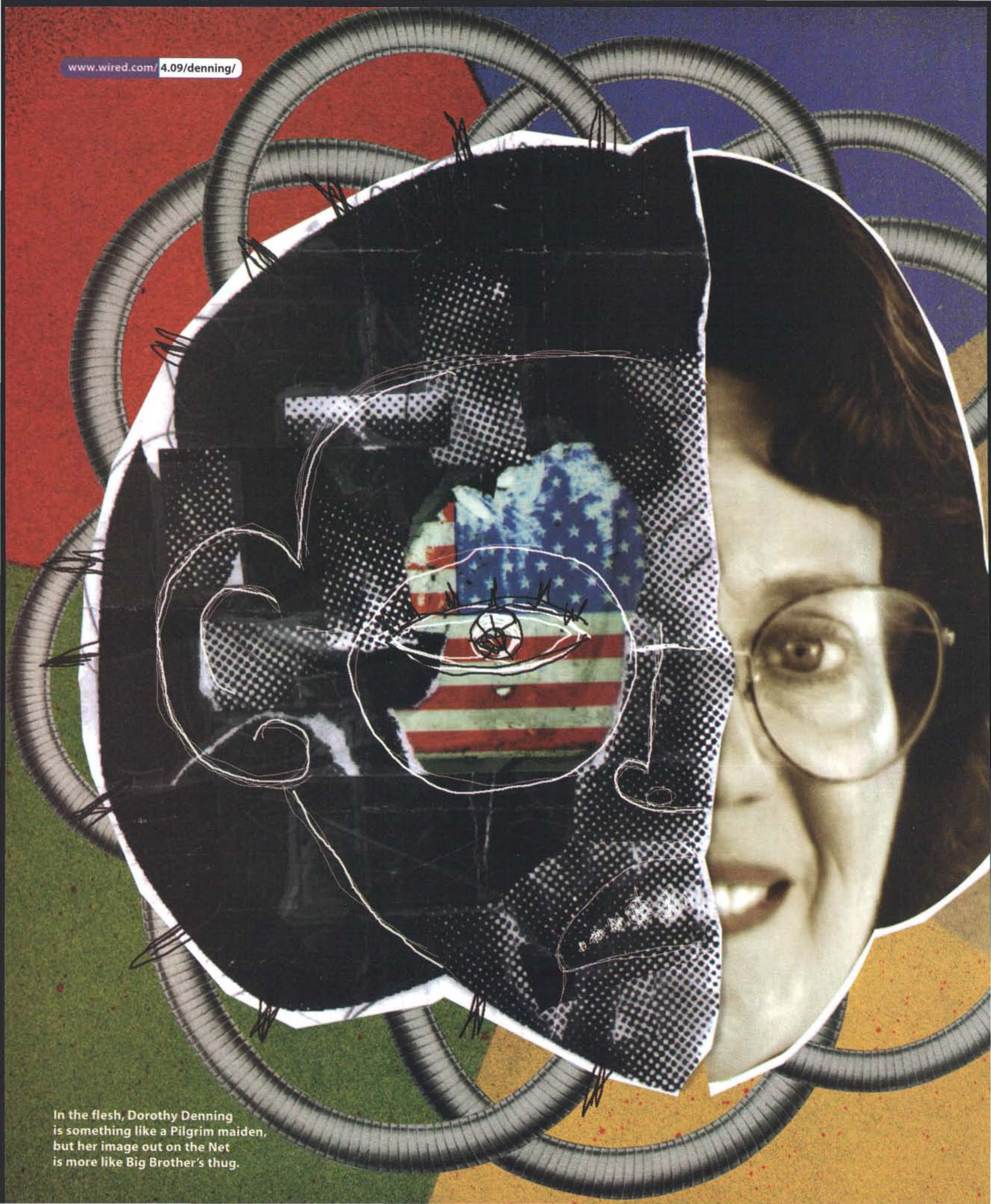
are not about

navigating content,

but staging experience.

By John Geirland





In the flesh, Dorothy Denning is something like a Pilgrim maiden, but her image out on the Net is more like Big Brother's thug.



DOROTHY DENNING  
WENT FROM HACKER HERO  
TO ONE OF THE MOST HATED PEOPLE  
ON THE NET BECAUSE

# CLIPPER CHICK

SHE CHANGED SIDES  
IN THE GOVERNMENT'S  
WAR AGAINST PRIVACY.

## WHAT'S GOING ON IN HER MIND?

Dorothy Denning points to a white plastic box, about the size of a trade paperback book, next to the telephone in her office at Georgetown University. "By the way," she says "that's a Clipper device." As she nods toward the item, Denning's face – a warm physiognomy that would fit the sort of church lady who never rapped a knuckle in her life – breaks into a characteristic smile: tentative, but welcoming. The smile acknowledges the joke, a joke on herself, really. I ask her when she last used the device, which allows her to speak with similarly equipped callers in total, unequivocal, uncrackable privacy – unless, of course, a legally authorized government wiretapper is eavesdropping. "Once in a while," she answers. "I must confess I haven't used it in a long time."

"When?"

She can't remember.

"Three months ago? Six months?"

"Oh, it could be a year. Part of the reason I have it here is so that, you know, it's a good conversation piece."

Not that I needed that slab of high tech to nudge Clipper into the conversation. By 1993 Dorothy Denning had earned a fine reputation in the field of computer security and cryptography, but the introduction that year of the Clipper Chip brought her a measure of fame that catapulted her beyond her perch in academia to a controversial and powerful role in the continuing debate about the regulation of cryptography in this country – and indeed the world. (Clipper, of course, was the government's proposed solution to its projected inability to conduct legal surveillance in an encrypted digital world.) For defending the government's position and having the nerve to insist that she was duty-bound as a citizen to do so, Denning has been reviled. On the Net, she has been the subject of ridicule on countless newsgroups and listservs, enduring vicious – often sexist – personal insults for simply expressing her opinions on matters crypto. She has been booed and hissed in public appearances. Fellow academics and former colleagues whisper that she has

BY STEVEN LEVY

ILLUSTRATION BY DAVID PLUNKERT

ORIGINAL PHOTO: ANDREW GOODMAN



abandoned scholarly distance and hopped into bed with the government. When pressed for a memorable example of vilification, Denning herself recalls, with a mix of bemusement and horror, one of the milder epithets: Clipper Chick.

Of course, her critics don't repeat such slurs to her face. Who could? She is 51 years old, meticulously polite, and she weighs about as much as one of George Foster's arms. (Bruce Sterling once described her as "something like a Pilgrim maiden behind leaded glass; if she were 6 inches high, Dorothy Denning would

**NO SINGLE PERSON, WITHIN OR WITHOUT GOVERNMENT, HAS BEEN AS FIERCE AN ADVOCATE OF THE CLINTON ADMINISTRATION'S CRYPTO POLICY AS DOROTHY DENNING.**

look great inside a china cabinet.") Yet the rage she generates in some of the foes of government crypto policy is a better indication of her real strength and of the considerable effect her lone voice has had in the debate over how – or whether – cryptography should be regulated.

Indeed, no single person, within or without the government, has been as fierce an advocate of the Clinton administration's crypto policy as Dorothy Denning. When White House officials do take the podium in defense of Clipper and its progeny, they usually make it clear that they would be happier discussing other less

contentious subjects. Most often, they require that you do not quote them for attribution. For them, defending crypto policy is like having dental surgery. By contrast, Denning has a passion for expounding the arguments for a system whereby so-called key escrow backdoors preserve government access to encrypted messages. And Denning is willing to swing the weight of her reputation behind it – which adds exponentially to her arguments. After all, she doesn't have to do this. As the years go by, the subject gains more attention, almost all of it directed at attacking the government's case, which has evolved from Clipper itself into a number of increasingly complicated schemes all embodying the essence of Clipper: government access to the keys that ensure the secrecy. Yet Denning persists, in perpetual

sync with the administration's position, chairing panels, churning out papers, writing Op-Ed pieces, zinging the opposition in cyberspace missives.

As you might expect, Dorothy Denning is very popular in government circles. Mike Nelson, until recently the administration's point person on the subject, is extremely high on her. So is Clint Brooks, the National Security Agency's architect of Clipper. And when FBI director Louis Freeh spoke last September at a conference Denning chaired on international crypto policy, he broke from his jeremiad on kiddie pornographers and Filipino terrorists hiding under the cover of RSA algorithms and thanked Denning "for the tremendous work and support that she has given to the development of education of these issues." Even critics of government policy admit she's the Feds' best weapon. "Dorothy Denning," says Marc Rotenberg of the Electronic Privacy Information Center, "has given a gloss of credibility to proposals that would not otherwise be taken seriously."

*Steven Levy (steven@echonyc.com), technology columnist for Newsweek, is author of Hackers and Insanely Great. His next book, Crypto, is about the revolution in cryptography.*

Denning posed with hackers Steve G. Steinberg, Craig Neidorf, and Eric Corley at a 1990 conference where she delivered a controversial paper that championed hackers and recommended working closely with them.





Why does Dorothy Denning do it? Her opponents sometimes look for a personal explanation, either mercenary or psychological. Denning heatedly denies any sellout; she says she gets no grants from the FBI or NSA. The psychological possibility is intriguing but elusive. There seems to be no Rosebud in her past to easily explain it – none of her friends or family members, for instance, were victims of a kidnapping in which insufficient information led to tragedy.

When pressed for any personal connection to the urgency of the key escrow scheme she defends (which hinges on generating an extra key to unlock data, and the government having access to that key), she takes some time to think about it and, after several days, emails a reply. There were times as a college student when she lost the keys to her apartment and the police had to let her in. And just recently, after taking her regular swim on the Georgetown campus, she emerged from the pool to find that she could not open the combination lock on her locker. Inside were her clothes, her money, her ID. She shivered as she contemplated the necessity of venturing outside in 40-degree cold, wearing only a wet bathing suit and a faltering smile, imploring strangers for help. That disaster was averted when a university worker snapped the lock with a bolt cutter, but the incident reinforced her belief in the value of a system that automatically provides a spare key.

Not exactly the stuff of spy novels. But there is drama in the story of Dorothy Denning's relentless defense of Clipper, and it comes from the path she has taken to get there. Just a decade ago, Denning was a relatively obscure academic, toiling in the field of computer security while courting no controversy. But six years ago, she suddenly emerged as a semi-pariah to the security crowd by announcing that instead of demonizing the young hackers who broke into computers, we should try to understand them, work with them, even learn from them. But no sooner had the cyber-liberties crowd begun to embrace this new champion than she jammed a hard right turn, siding

strongly with law enforcement and the government point of view – eventually becoming the FBI's favorite prof, cleared to hear top-secret skinny from the NSA. Because of her previous views, each swing of her pendulum was akin to a celebrated defection to an enemy camp. Those sharing her new views were delighted that she finally saw the light and welcomed the status she brought to the cause. Those she left behind felt betrayed and wondered if she'd taken leave of her senses.

Yet there is a consistency to Dorothy Denning: at every turn, she does what she feels is right, and the elements that determine her positions are intensely personal. Ultimately, hers is the tale of a woman who quietly yet determinedly succeeds in a world where few women venture – but finds her ultimate success in discovering an unlikely niche where she can finally be herself.

It's her husband, Peter Denning, himself a distinguished computer scientist, who underscores the depth of her commitment today. To hear him talk, his wife almost thinks she has been tapped by God to defend crypto policy in spite of the legions aligned against her.

"I don't care if I'm alone," he imagines her thinking, "I believe it's my destiny."

#### **Newbie prof**

Dorothy Elizabeth Robling was born in 1945 ("a great year for French wine," she says) 214 ►



Denning with Donn Parker, the hawkish computer-crime guru, at the same 1990 conference where she delivered her pro-hacker paper that ruffled the computer security world. Parker first prodded Denning into talking to the victims of hackers. Then he began swinging her mind to the law enforcement point of view.



## Me Generation

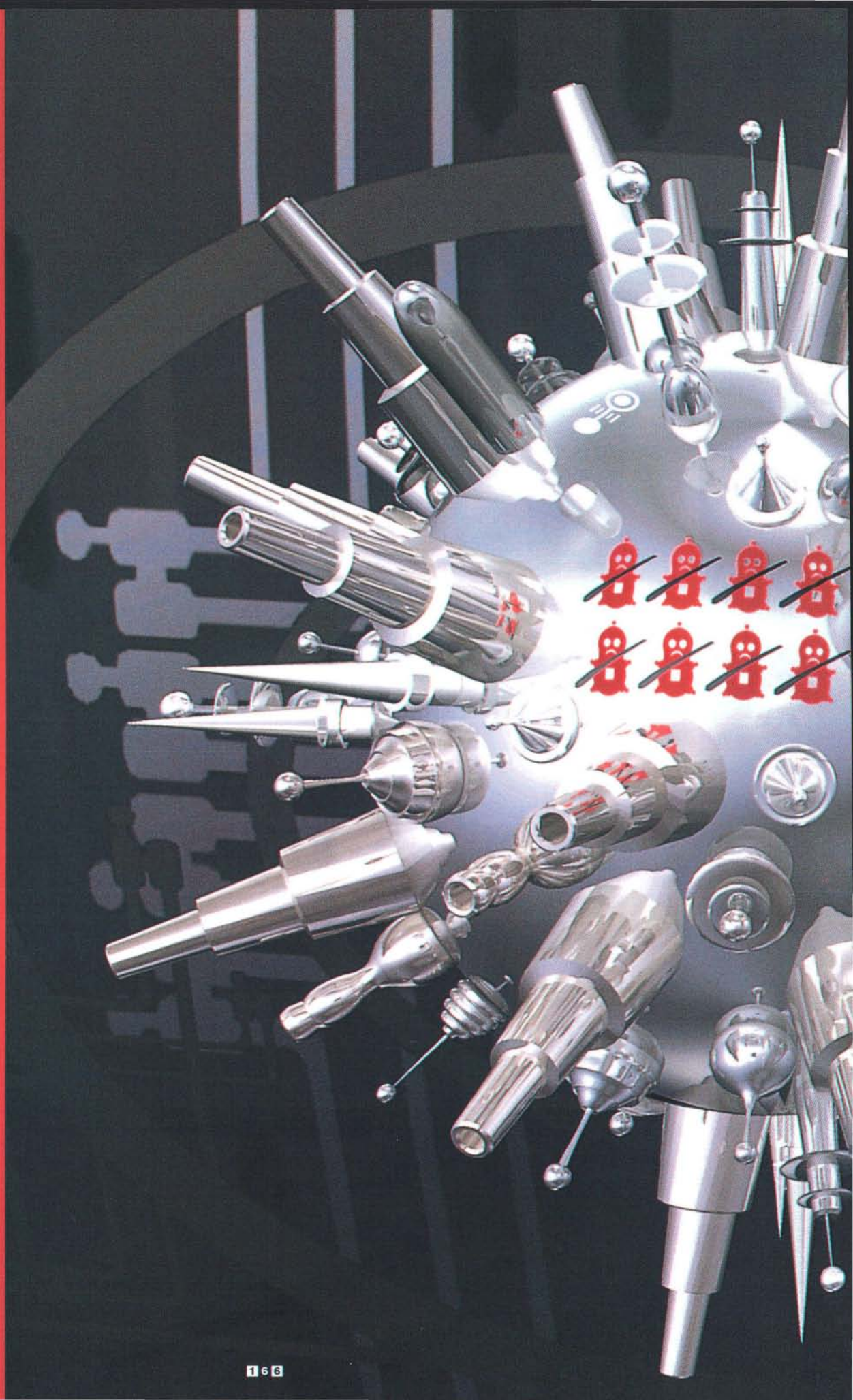
In the words of digital artist Paul White, Dog is a "battleship-porcupine cum dog in a kennel" and the space-cruising bad guy in *Cowboy*, the latest video promo from Japanese pop idol Noriyuki Makihara.

Working on projects for Icelandic chanteuse Björk and Nike, White's London-based Me Company has developed a machine-dependent aesthetic that plunges the viewer into glutinous digital space. This image alone required 250 hours of processing time.

"Dog's a bit of a beast – his polygon count is extremely high," explains White, in tones that sound suspiciously like affection for this metallized mutt.

To track down more of Me Company's techno indulgences, dial up +44 (171) 482 4262, fax +44 (171) 284 0402, or email [meco@meco.demon.co.uk](mailto:meco@meco.demon.co.uk).  
– Rick Poynor

*Rick Poynor (rpoynor@dircon.co.uk) is the editor of Eye, an international review of graphic design.*









**Wired:** It says here on your card, "Resident Futurist."

**How does one become a resident futurist?**

**Wacker:** You become a futurist just by announcing that you are.

**Umm, so what do you actually do?**

My job is partly to be a provocateur. My role is to make sure that companies I consult for don't make sins of omission. When they try to define the boundaries for a strategy or a problem or a new product, my job is to make sure that they aren't setting them in a constricting layout and therefore limiting their flexibility and their opportunity.

**Do you make predictions?**

Five years ago, I predicted that Halloween would become the second biggest holiday in the country. As far as influence upon our psyche, it is now second only to Christmas.

**So, how does a resident futurist go about making such forecasts?**

I think any futurist who tells you they know what's going to happen is being a bit arrogant. Rather, it's really like being a good science fiction writer. There's a logic behind your story; it makes you nod your

surface sense of their personal mythology. Also interestingly, every teenaged boy took at least one picture of the same thing: somebody mooning.

**Does your research point to any large-scale trends?**

The last 500 years have been West to East, but we're going to have the initiative over the next 500 years coming East to West. We have a predisposition in Western culture for "just do it," to coin a phrase. Whereas, I think that part of the future will be built much more around "just be it."

**Does that persuade you that the next century will be an Asian century rather than an American?**

America is not going to be setting the pace of the world. But we do own the dissemination, OK? "Circle of Life," from the soundtrack of the Number One movie in '94, *The Lion King*, is an Eastern initiative. The source of trends is going to become East to West. But the infrastructure of trend dissemination is owned in America.

**There's already a very big, powerful, dynamic place where East meets West. It's called Russia. And it's looking for a job, by the way.**

I agree. That's a very possible 100-year scenario. I see the Sleeping Bear rising. It doesn't have to be Russia per se but perhaps the Balkans. But to tell you the

Among the inventions of California, the think tank may be the most overlooked. Part research lab, part consulting racket, and part sand-box for bright, nerdy types, a think tank sells deep analysis of complex trends in politics, society, and technology. One of the most legendary think tanks is SRI, based in Menlo Park, California. Watts Wacker joined SRI in 1995 as a futurist; previously, he ran a global project for Yankelovich, another think tank, tracking the shifting values of consumers – as in, *What do they want?* Although he has a degree in cultural history, Wacker's formative education came from his three years with the Kenner toy company and from the two radio stations he operated in Texas.

## Futurist Watts Wacker on panhandling as research, the new mood of "just be it," and why life is too long. By Kevin Kelly

head and go, Yeah, I could see that. That could happen.

**Then how do you come up with these persuasive "could-be" stories?**

One of my favorite techniques is to use observational work. For instance, recently I've bused tables at Taco Bells. I've driven the shuttle

bus from Avis. I panhandle in the George Washington bus terminal – my record is US\$62.14 in one day.

**And what do you learn from doing that?**

I would call my observational work a tool for gaining social empathy, for perspectives other than my own.

**What other methods do you use?**

I've given 1,000 teenaged boys a camera with 100 pictures to take of their life. I then sort out what's going on with kids in general based on their visuals, not words.

**And what did that tell you?**

If you really want to understand what's happening with a kid, the only place you need to excavate is their room. Because it is an unbelievably on-the-

truth, I think the pacesetter is not going to be within a corporate boundary.

**Where else do you look for forecasts?**

In language. About 25 percent of the English language is new – created in the last 20 years. Take the term *modularity*. A couple of decades ago it was usually applied to a stereo, what my generation called components. Well, there is a new word for that today, it's called *peripheral*. The only ones who own the word *peripheral* are in the information industries. But, listen. How come there's no food peripherals? And what about travel peripherals? If you can own the vocabulary, you've got a head start on everybody.

**As a futurist looking at long trends, do you think that the world's getting better or getting worse?**

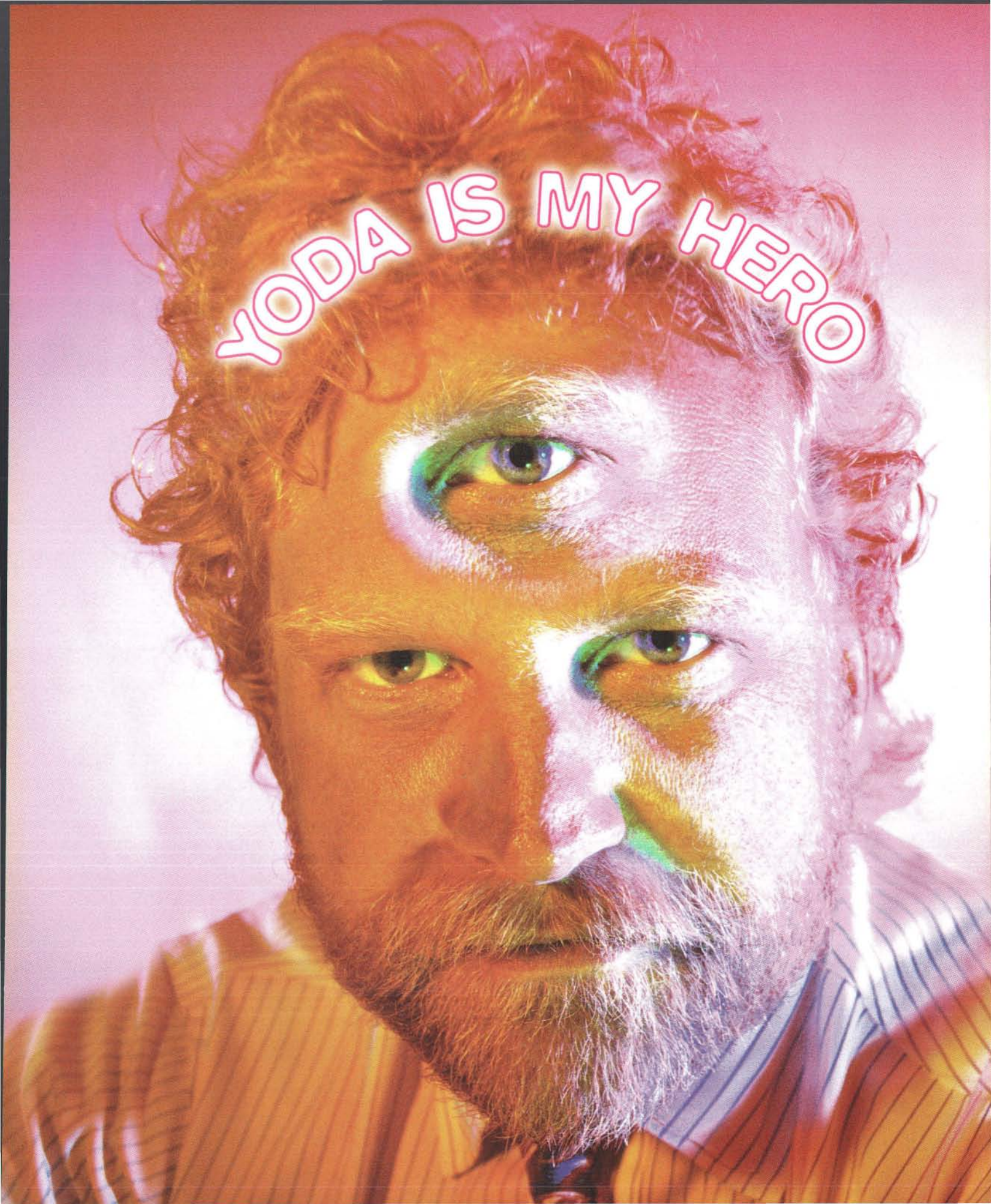
The previous generations embraced the value that "life is too short," right? In the next generation, we're going to change that fundamentally to "life is too long."

**Do you have any heroes?**

Yes: Yoda. Yoda says [switching to amazing Yoda voice], "Try? Try not, do. There is no try." Every word Yoda said was sacred. ■ ■ ■

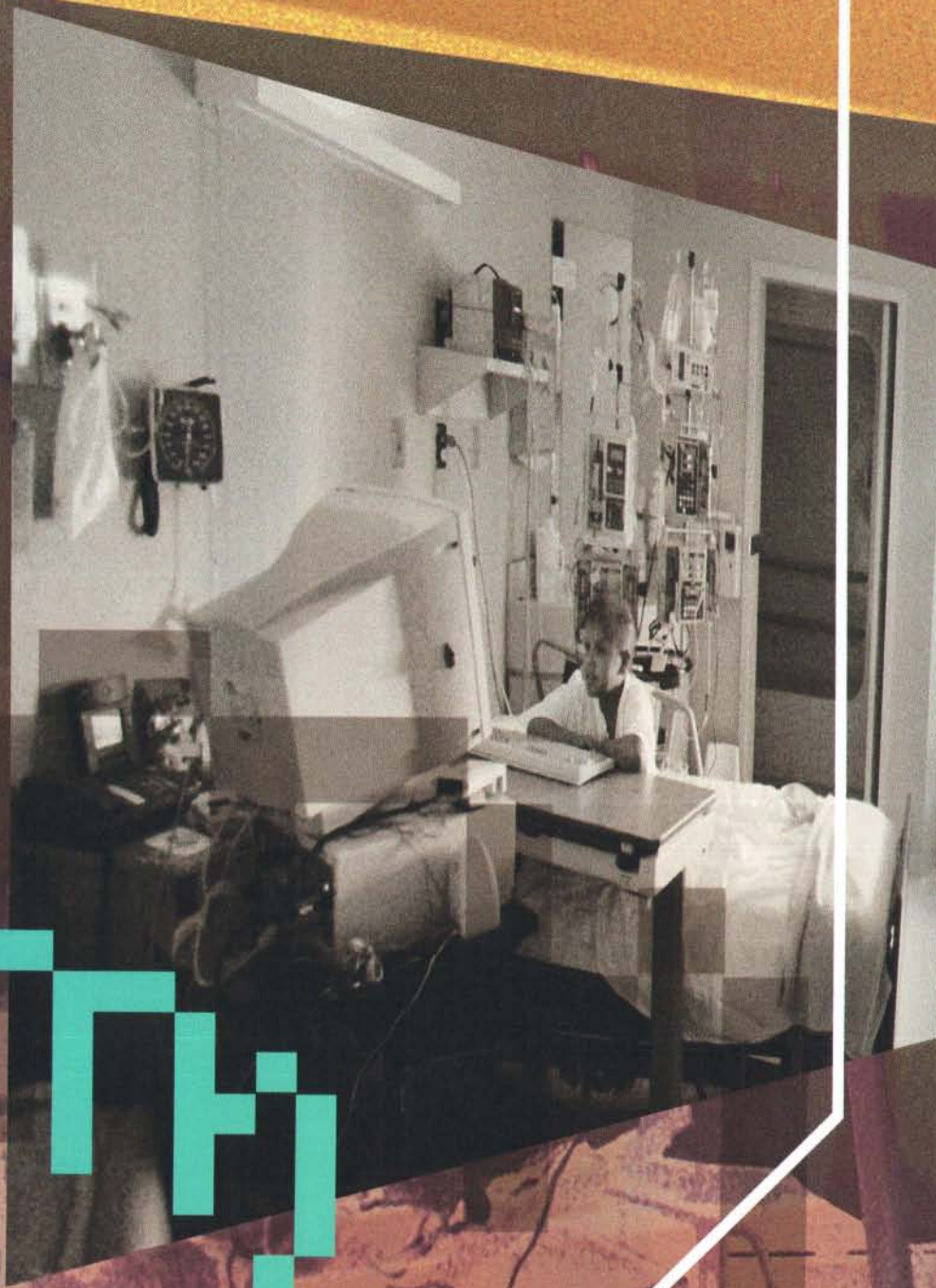
Kevin Kelly (kk@well.com) is executive editor of Wired.





YODA IS MY HERO









Director Steven Spielberg and a bunch of corporate suits created Starbright World to bring a virtual Eden of state-of-the-art relationship technologies to sick kids stuck in hospitals.

Call it R&D with an unbeatable PR angle.

[www.wired.com/4.09/starbright/](http://www.wired.com/4.09/starbright/)

**N**o one's more wired than Vanessa Gonzalez. A poised 13-year-old in T-shirt, shorts, pink socks, and a charm bracelet, she's a VR expert who's mastered Starbright World, a 3-D virtual Eden with real-time videoconferencing.

She's navigating Starbright World now, via a Pentium-based workstation. Around the screen is a whimsical frame with pictures of wooden Tinkertoys and the logos of Star-

getting for osteosarcoma, and she's hooked to an IV pole with three drip bags – two clear and one yellow. A monitor on the IV flashes numbers: 10.0, 13.0, 7.4. Before Vanessa has settled at the Starbright terminal the monitor beeps, and she checks it calmly. "I need to get plugged in," she says.

The Starbright Pediatric Network, which includes Starbright World, aims to connect children who are hospitalized

windowless "rec-tech room" at the Lucile Salter Packard Children's Hospital at Stanford University. Although ultimately there will be Starbright sta-

By Susan McCarthy

## > the good deed <

bright's corporate partners. A small videocamera is perched to the right of the monitor. Vanessa wears a headset, and conversations are audible throughout the room. The sound quality isn't great, but the speech is clear.

Vanessa's hair is fuzz-short because of chemotherapy she's

for long periods or must return repeatedly. It links children like Vanessa in Palo Alto, California, with others in Pittsburgh, New York, Dallas, and elsewhere, who come for chemotherapy, for organ transplants, or with chronic illnesses like cystic fibrosis.

Vanessa is sitting in a small

tions that can be wheeled to children's beds, for now the necessary DS3 (equivalent to T3) wiring has been installed only here and in the main playroom.

Vanessa, represented in Starbright World by a helicopter, is "just churning around" until – in Cave World – she meets a fish, denoting a user at a Pittsburgh hospital. In text, they agree to switch to videoconferencing. The Pittsburgh fish turns out to be Rachel, who's 17. (Names and other identifying details of children at the Pittsburgh hospital have been changed.) Asthma has put

Rachel in the hospital. The screen shows her sitting slouched in the playroom. In a corner of the screen, a smaller image shows Vanessa, as Pittsburgh sees her. "What are you guys doing?" Rachel asks. "Anything exciting?"

"No. Not really."


"It sounds like a normal hospital."

"Very," says Vanessa dryly.

**A** child using Starbright World these days is often ringed by observers – product developers, medical experts, hospital public relations people, parents, and reporters like me. Still in beta testing, Starbright is courting publicity. So are the four corporate partners who have made this broadband network possible – Intel Corp. is contributing workstations and its ProShare Video System 1.9; UB Networks Inc. is supplying local-area networking; Sprint Communications Co. is providing DS3 lines; and Worlds Inc. is contributing

Susan McCarthy (sumac@well.com) is the co-author, with Jeffrey Moussaieff Masson, of *When Elephants Weep*.





Steven Spielberg lured the sponsors, lured the big donors, lured the reporters. The prospect of meeting him via his avatar, E.T., has helped coax shy kids online.







the virtual reality space.

The kids navigate one of the most advanced video networks on the planet – an unequalled package bundling real-time videoconferencing with a series of real-time multiuser 3-D virtual worlds. The kids get top-of-the-line Pentium machines (32 megs of RAM) with ATM lines (133 bps or more). As the project brings diverse state-of-the-art technologies together, the corporate partners are avidly watching this almost perfect – if costly – test arena for broadband networking.

Always hovering nearby are “child life” specialists, hospital employees whose job it is to make patients’ lives more tolerable and who act as educators, helping children and their families adapt to hospital life and medical procedures. At hospitals with Starbright World, child life specialists also become technical support people. For them, Starbright promises a way to lure depressed children

out of their rooms, to show a child with a rare disease that there are others in a similar condition, or to make some part of hospital life an exciting and enviable experience.

This multimillion-dollar project was organized by Starbright, a self-styled “entrepreneurial charity” that is a sibling foundation to Starlight, a conventional charity granting wishes to critically ill children. Starlight’s co-founder, Peter Samuelson, is a Hollywood producer (*Revenge of the Nerds*, *Tom & Viv*) who had begun to feel that Starlight left sick kids miserably entertained. He describes visiting one hospital and asking a nurse how a boy in traction could change channels on the black-and-white wall-mounted TV. “We have a

“I’m all the way in Pittsburgh and you’re

all the way in California. Is it dark there yet?”



Therapeutic work with these kids strives to get them to come out of their shells, to come out of their concern with themselves and their sickness and to start socializing again.



Starbright World allows cancer patients in New York – like 19-year-old David, above – to connect with the girls shown at right. They are the sister and cousin of Sulyana Guerrero, in a hospital in Dallas for a bone-marrow transplant.

remote control,” replied the nurse, fetching a 10-foot-long bamboo pole. Samuelson says, “The poor kid was supposed to lie in bed and poke the button with it!”

Samuelson reacted by starting two programs: Starlight Express, media rooms installed in pediatric hospitals, and Starlight Express Fun Centers, VCR-PC-laserdisc-videogame combos on carts that slide over a child’s bed and that have been distributed to more than 1,000 hospitals.

Off-the-shelf software used in those two programs “was having a very good effect on the kids,” Samuelson says, but “I began to wonder what would happen if we made software focused on kids’ needs.” He enlisted the help of Steven

Spielberg, the 300-pound gorilla of the entertainment industry, who agreed to chair the new Starbright Foundation and made a seven-figure donation.

Out of their ambition – to combine Southern California’s entertainment industry with pediatric medicine and new interactive technologies – came the remarkable combination of benevolence and marketing that is the Starbright Pediatric Network.

The corporate partners get a chance to test-market new technology on a real-world population in an unquestionably philanthropic way. Some are deploying technologies previously restricted to business markets. (Will children accept them?) They are forming valuable alliances with the other corporate partners and with the entertainment industry. Thus, Worlds Inc. program manager Kevin Ugarte remarks, though some think it’s insane for a start-up like Worlds to



invest in a huge project like Starbright, the program not only connects the company with bigger corporate players and lets it learn to work with children, but also acts as an intense idea generator.

In addition, all those who actually go into the hospitals seem deeply struck by the human value of the endeavor, almost startled by the genuineness of the Good Deed.

As for the children, they get a break from the grimness and tedium of institutional routine. And they communicate with other sick kids in powerful, unprecedented ways.

**R**achel and Vanessa decide to go back into virtual reality and explore Cave World. Instead of talking through text, they carry the audio with them, a favorite technique.

They go into Tropical World, a gorgeous land of palms, low mountains, and pools. Entering a rainbow, they whiz to Sky World: flocks of high-heaped cumulus, one holding a classic Mad King Ludwig castle. Colette Case, a child life specialist at Vanessa's end of the line, suggests they visit the Build Your Own Zone, where users can create structures. They descend into the BYOZ through a tornado, but can't find each other visually.

"We're gonna fly above and see if we can see you guys," says Rachel. "What are you near?"

"I'm by the wall with flames of fire on it," says Vanessa.

But the BYOZ is such a tumult of walls, midair waterfalls, big-eyeballed plants, cubes, and staring green aliens,

that it's not easy to locate the wall of flames.

Finally they cut the connection, meet in Tropical World, and go through a gold sliding door to arrive back in Cave World, a mysterious dim green streaky maze. Rachel remarks, "I've never really been in the cave. This girl Marie, like she's always in the cave. Oh wait, here's Marie!" Marie walks up to the terminal in the Pittsburgh playroom, and Rachel points to – and introduces – the helicopter on the screen. "This is Vanessa – in California."

**S**hortly after joining Starbright's board, Lee Rosenberg, a senior vice president at the William Morris Talent Agency and a founder of Triad Artists, arranged a large lunch meeting in 1993 for pediatric specialists, members of the entertainment industry, and representatives of companies like Brøderbund and Microsoft. It was designed as a brainstorming session to find solutions to emotional and physical problems confronting critically ill children.

The brainstormers came up with 25 projects. Seven, with various corporate partners, are in development, including Starbright, which has raised several million dollars. General Norman Schwarzkopf was drafted to head a campaign to raise US\$60 million more.

Everyone has agreed *not* to specify how much Starbright costs: "multimillions" is all they'll say. It's obviously not cheap. The more than 100 high-end PCs supplied by Intel, for example, retail for around \$6,000 each. Worlds Inc. has

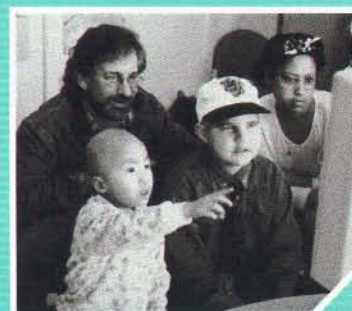
devoted up to eight people at a time to Starbright. Sprint is supplying and maintaining seven DS3 connections, more than any of their corporate customers have.

**V**anessa, Rachel, and Marie switch back to videoconferencing. They go through introductions. Marie, 14 in a few days, is there from Vermont because "my liver numbers went up. As you can probably

they thought would help sick children. The corporations they approached hesitated. "We knew that Spielberg was capable of having a great dream; we just didn't know if his dream was implementable," says Avram Miller, Intel's vice president for business development, a unit formed to seek out new markets for Intel processors.

Roel Pieper, CEO of Tandem Computers Inc., parent company to UB Networks, agrees.

Master storyteller Steven Spielberg watches Ryan, Bobbie, and Adrienne spin their own stories (left), Starbright is designed to encourage groups of kids to cooperate but also to engage kids in isolation, like 7-year-old Sulyana Guerrero, right.



see, I'm a little bit yellow." She sounds weary. "They're probably going to do a transplant." An ebullient 12-year-old, Emma, squeezes in next to Marie. She doesn't want to talk about illness, though she does want to know how long Vanessa's been in.

"This is my second day so far."

"This is my first day here," says Emma. "I come here a lot though."

"Me too."

**S**tarbright fundraisers didn't simply ask for big donations, they asked for the creation of an unprecedented network and specified what

"It was a risky endeavor. We didn't know if we could get all the ATM technology to work, we didn't know if we could get sufficient performance for the ProShare videoconferencing, we didn't know if we could get sufficient acceptance from the children on the 3-D graphics."

But the project had great allure for the corporate partners. It's R&D with an unbeatable PR angle. While such a partnership *could* happen in the strictly for-profit world, Miller says corporations alone would be unlikely to tackle a project with sick kids.

"It's the kind of thing that Steven Spielberg, who is a storyteller and has a rela- 230 ►





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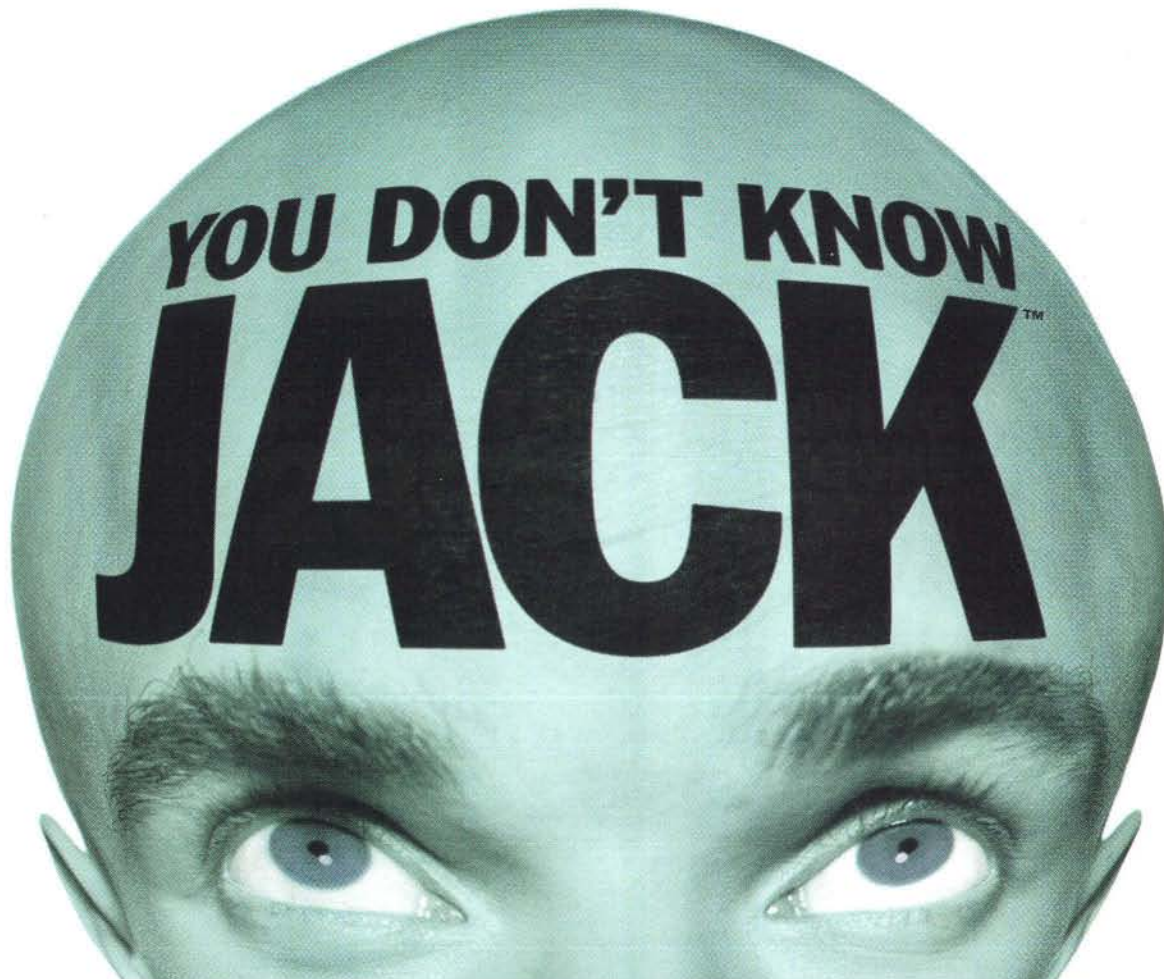
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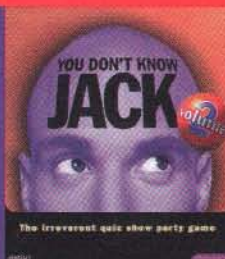
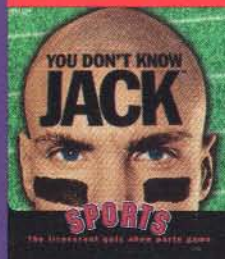
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**ROCKETING  
INTO RETAILERS  
THIS FALL.**

CD-ROM for Windows® 95, Windows 3.1 & Macintosh®

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### Atmospheric Alchemy

Nothing is ever simple in the underground kingdom of Zork. Just when you thought you'd banished evil forever, *Zork Nemesis* comes along. Fortunately, it's a creepy, atmospheric treat.

Structured like *Myst*, with four realms (Monastery, Asylum, Castle, and Conservatory) branching from a central Temple, *Zork Nemesis* takes the borrowed form a step further by allowing smoothly scrolling 360-degree perspectives. Gameplay is a good mix of exploration, puzzle solving, and sinister revelations. The excellent video sequences, directed by Joe Napolitano (*The X-Files*), are used sparingly: you won't get stuck in



#### Sinister revelation.

endless replays. The music is haunting. And with art designed by Mauro Borrelli (*Batman Forever*, *Bram Stoker's Dracula*), *Zork* is now so beautifully weird that you won't mind looking at it for 40 hours. This is not a game you'll exhaust in a day or two.

You can probably get through *Zork Nemesis* without buying a clue. However, you'd better brush up on your alchemy if you want to survive the encounter with the Nemesis. Let's see, that's earth, air, fire, water, and ... Uh ... Uh ... AIEEEE!  
— Marc Laidlaw

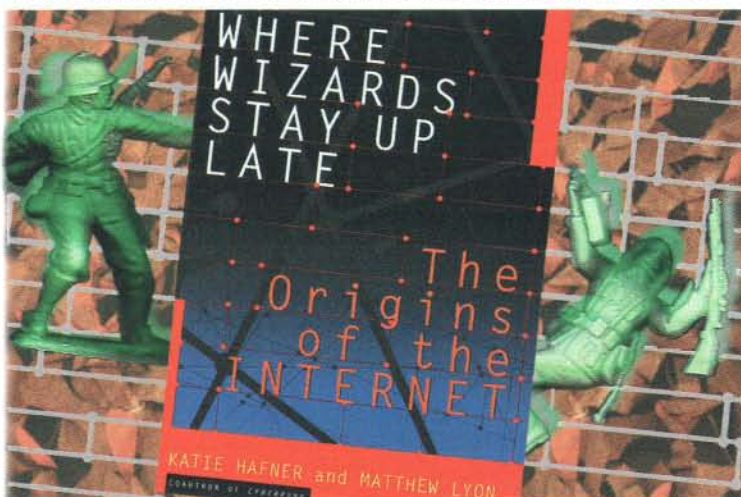
*Zork Nemesis* MS-DOS/  
Windows 95: US\$54.95.  
Activision: (800) 477 3650,  
+1 (310) 473 9200, fax  
+1 (310) 479 4005.

## The Revolution Will Be Netcast

Contrary to the common folktale, the genesis of the Internet was not a Cold War effort by the US military to route communications around potential nuclear strikes. Initiated by the Defense Department at the beginning of the '70s, Arpanet was strictly a program to link the computation resources of the major American computer centers. When the overwhelming usage turned out to be email, that came as a surprise.

Some legends fade and new ones emerge in *Where Wizards Stay Up Late*. Book authors Katie Hafner and Matthew Lyon offer a detailed account of the creation and deployment of what may be the US government's highest-leverage peacetime project since the GI Bill sent a generation of World War II veterans to college and put the US firmly on the knowledge-industry path. The writing by Hafner and Lyon is low-key, journalistic, and careful. The news tells itself.

An earlier enabling technology for Arpanet was developed out of Cold War paranoia. That was packet switching, whereby digital fractions of a message could fan out Web-fashion and converge on their target address by multiple routes of opportunity. Paul Baran devised packet switching at Rand Corporation around 1960 with the atomic threat very much in mind, along with then-current ideas about how



#### Twenty-five years of evolutionary engineering.

the brain worked. AT&T fought his theory doggedly. In the early '70s, when Arpanet was offered to AT&T, the company declined to have anything to do with it – a classic case of corporate blindness.

The Internet is a child of its history, and that history is largely unknown. This able book fills a growing need, as myriads of new people arrive daily on the Internet unprepared for peculiarities that are the product of 25 years of evolution. This is the way a world begins: distributed engineering. To a denizen of the Net now, it's like discovering that mountains, oceans, weather, fire, and gravity were each once someone's bright, disputed idea.

Unlike the hacker-driven personal computer revolution, the Internet was largely created by professional engineers who showed up at work at 9 a.m. and went home to their families at 5 p.m. Some are now cultural heroes; many are unknown. When Bolt Beranek and Newman summoned a reunion of Internet engineers in 1994 – the occasion for assembling this book – they nearly forgot to invite Paul Baran.

The personal computer revolution is over (Bill won). The Net revolution is still in progress. — Stewart Brand

*Where Wizards Stay Up Late: The Origins of the Internet*, by Katie Hafner and Matthew Lyon: US\$24. Simon & Schuster: (800) 223 2348, +1 (212) 698 7000, fax +1 (212) 698 7336.



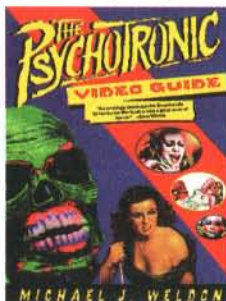




## Bible of B Movies

In the mood for a video so turgid or escapist that the problems of the day will disappear within minutes of the opening credits? Check out Michael J. Weldon's epic *The Psychotronic Video Guide*, a listing of 3,000-plus films.

This book covers the whole shebang of cinematic excess and exploitation. Each entry includes a brief plot summary and, where applicable, tidbits of production history and theatrical notoriety. The usual suspects are present – Roger Corman, Troma Pictures, and every women-in-prison flick imaginable. There are also many discoveries (including D. W. Griffith's chiller *The Avenging Conscience*) and tributes to forgotten genres



### Do carry on.

(such as the British *Carry On* ribald comedy series, virtually unknown to US audiences).

Some productions – such as John Huston's *Moby Dick* – just do not fit into the B-movie category, no matter how far it is stretched. Likewise, there is the conspicuous absence of several cult classics, notably Jayne Mansfield's nudie landmark *Promises! Promises!*

Despite occasional shortcomings, *The Psychotronic Video Guide* reminds us what movies are about – having fun! – Phil Hall

*The Psychotronic Video Guide*, by Michael J. Weldon: US\$27.50. St. Martin's Press: +1 (212) 387 9100.

## Invasion of the Pods

Sure technology can be alienating ... but is that necessarily a bad thing? Consider the good, old-fashioned 1950s-style listening booth: prime selling point of the mom-and-pop record shop, each romantic booth at the back of the store offered the opportunity to score the skinny on a brand spankin' new vinyl gem. But it must've taken a will of steel – or a certain shamelessness – to stroll forth and say No thanks. They were between you and the door.

Well, thanks to the joys of digitech and the fragmentation of "late capitalism," that particular little money trap has been unsprung. For the last couple of years, the city-state-esque music depots – your Tower Records and Virgin Megastores – have sprouted the '90s version of listening booths. Row after row of the newfangled stations line the walls, alcoves, and columns of numerous stores; each of the little pods is usually loaded with several new CDs, often grouped by genre, and a simple control-set that lets you access any track your ear desires and pump up the volume. The flagship Virgin outlet in San Francisco, for example, has more than 10,000 songs to audition till your heart's content.

The total anonymity of the experience has a couple of advantages.



### We're talking free entertainment, baby.

First off, however dull your daily drag, you can be the baddest dog or coolest kitty of them all as you strike a pose in the record store: in this post-booth era, the experience involves little more than you and a pair of headphones leaning up against a wall or column, perusing the choice-laden sets of jewel-boxes that line every vertical surface, before dialing in to your exploratory reverie. Lips in a sneer, dark glasses in full effect, checking out anyone and everyone as a self-selected soundtrack rolls through your skull. Much hipper than the painfully slow, drastically limited, and annoyingly incomplete samples found on the Net; think of it as the righteous reclaiming of private space for public performance (and no one'll ever know if you're bobbing your head to mad beats or Madonna ballads). Second, no sneaky indebtedness. Chat up a clerk only if you want; present a cash equivalent only if you gotta have it now. But if you'd prefer faceless technology, you're out the door a well-informed camper with no psychic strings attached. We're talking free entertainment, baby. You can always haul your newfound knowledge down to an indie outlet and trade pay for product with the '90s avatars of mom-and-pop. – Jane Dark

Listening stations: free. Available at music megastores nationwide.

## Net Searching Jr.

I recently had to do a school report on spiders. I got my information the usual way – by going to the library and looking through large encyclopedias under "spider" and "arachnid." I found the subject interesting, and I wanted to find out more on the Web. I asked my parents about what search site to use, and they suggested I try out Yahoo!igans!, Yahoo!'s new site especially for kids.

Right up front I found icons leading to new and cool sites, a Yahoo!igans! club, and an information area full of useful tips on searching and navigating the site. In the center of the page is a field where you can type keywords for your search. Further down are many subject-based links for different sections of Yahoo!igans!, including areas about school, entertainment, and science.

When I typed arachnology in the search field, I got a link to a long list of sites. I learned many interesting facts such as there are 30,000 species of spiders in every continent except Antarctica.

Yahoo!igans! isn't just for homework. It's also



A romper room of kid links.

great fun. I wanted some information about Nintendo's *Donkey Kong Country 2*. So I tried a link to the Nintendo Power page. It had plenty of information on all kinds of games.

You don't have to be an expert to use Yahoo!igans! You just type a keyword in the search field. I could find almost any basic subject I needed. The problem is, there isn't a lot of detail to many things, and you may not find exactly what you are looking for. For instance, when I tried a search on medieval history, I typed *medieval* and then *Middle Ages* in the search field, I didn't get any matches. Maybe the particular words I used didn't appear on any of the Web pages listed by Yahoo!igans! Possibly because medieval sites aren't something Yahoo! thinks kids like.

Yahoo!igans! offers a lot of fun and interesting sites and gives several ways to search. Even if its scope is limited, this is a great place for kids to scour the Web. – Eddie Glaser

Yahoo!igans!: [www.yahoo!igans.com/](http://www.yahoo!igans.com/). Yahoo! Corporation: +1 (408) 328 3300, fax +1 (408) 328 3301, email [webmaster@yahoo!igans.com](mailto:webmaster@yahoo!igans.com).





SCRATCH 'N SNIFF

*"I **fart** in your general direction"*



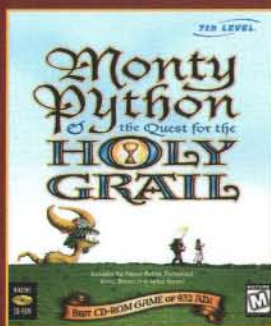
7th LEVEL



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(THOSE RESPONSIBLE FOR PUTTING THE FART SMELL IN THIS MAGAZINE HAVE BEEN SACKED.)



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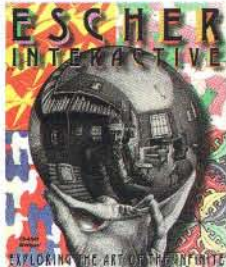


## Anarchists in the UK

### Escher Vision

**B**efore LSD, there was Escher. The intricate woodcuts of Maurits Cornelis Escher created a strange world of visual puns and distorted perspectives where swans morphed into salmon. This Dutch artist gets poked and prodded in *Escher Interactive*, an ambitious, albeit uneven, retrospective.

While a good part of *Escher Interactive* is the standard sit-and-stare slide show, it manages to break out of this electronic cul-de-sac. Visual puzzles help you unknot Escher's complex graphic formulas. It's a crafty technique that illuminates the complexity of his spatial illusions. At least publishers Byron Preiss and Harry Abrams got that right. But one of



### Before there was LSD ...

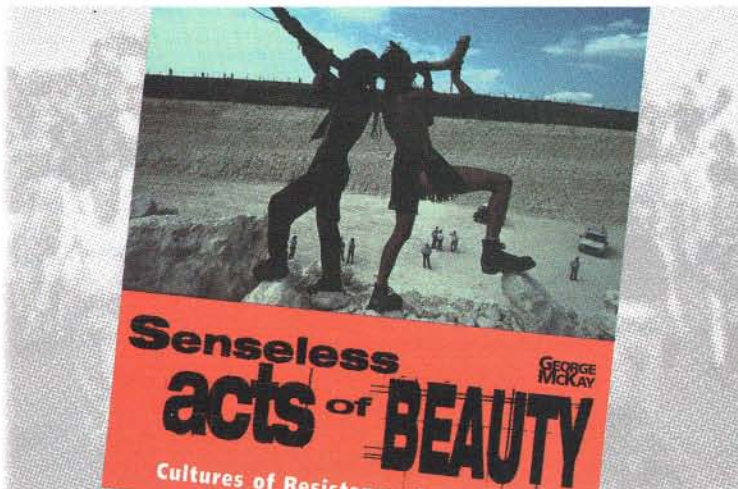
these days they ought to hire a graphic designer. The interface looks like it was created by a blind man.

If you don't get stalled on the flat-footed presentation, you're rewarded with a walk through a fascinating mind. Escher often sacrificed lyricism for technique. Yet Escher believed he could capture the infinite within a closed cycle. Scientists will recognize a soul mate in Escher. He challenges us to look for new relationships between seemingly unrelated phenomena. In them, reality is a wondrous, logical beast. — James Daly

*Escher Interactive* CD-ROM: US\$39.95. Byron Preiss: (800) 945 3155, +1 (212) 989 6252, fax +1 (212) 633 0332, email [bpmc@aol.com](mailto:bpmc@aol.com).

**H**ere are the first four things I noticed about *Senseless Acts of Beauty*: 1) The title. "Ugh. Reminds me of a precious bumper sticker." 2) The cover photo of two modern primitives, in silhouette, blowing into some kind of prehistoric horns on the rim of a dry quarry or desert sink hole. "Wow. Didn't I see them at Burning Man?" 3) The subtitle, *Cultures of Resistance Since the Sixties*. "Better." 4) The epigram in the introduction, from the band Chumbawumba. "Any book that quotes Chumbawumba, I gotta read!"

*Senseless Acts of Beauty*, as the subtitle suggests, tracks the post-'60s flowering of a number of loosely affiliated dissident groups in the UK, where there was no Altamont/Hell's Angels violence to dampen enthusiasm for free concerts and outdoor fairs. Over six chapters, George McKay, a veteran punk and squatter, charts the exploits of the Albion Free State, the mini-Woodstocks held at Stonehenge, the New Age travelers who convoyed the blue highways in search of good camping and parties, and "eco-rads," the British answer to Earth First! Along the way, McKay stops to make a case for Crass, a punk band/anarchist collective he feels had a far more pervasive influence than has been acknowledged. When The Clash sang, "Hah you think it's funny/ Turning rebellion into money," Crass, ever the punk purists, responded:



### Cultures of resistance since the Sixties.

"CBS promote the clash/ but it ain't for revolution, it's just for cash."

No doubt *Senseless* would have made more sense to me if I'd lived in the UK during the '70s or '80s. McKay's narrative, which I suspect derives from speeches given at universities, sometimes irritates. A veteran of the scenes McKay chronicles, he wants to have his gâteau and eat it, too. He likes to confess his own participant-enthusiast point of view, but then pull back into analytical, anthropologist mode. He excels at both, but rarely in the transition between them.

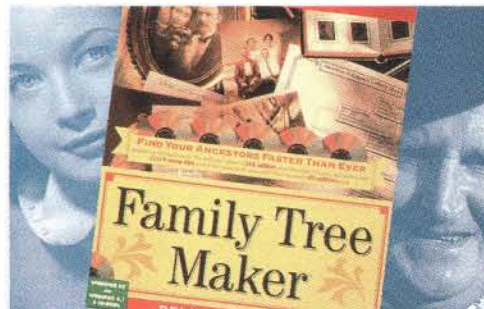
Neither the British-centricity nor McKay's narrative unevenness diminish the book's chief contributions, however. He demonstrates convincingly that the '60s were not some fluke and that countercultural practices popularized then have fed pockets of resistance ever since. Most important, he identifies the DIY (do it yourself) culture/ethic of the '70s as the foundation of resistance in the '90s. And, while the idea that resistance in a consumer-driven society can be as simple as making your own festivals, music, videos, zines, games, et cetera, rather than buying them ready-made may not strike a majority of readers as a revelation, it remains profound in a world united culturally by Coca-Cola, Mickey Mouse, and the united colors of Benetton. — Brad Wieners

*Senseless Acts of Beauty: Cultures of Resistance Since the Sixties*, by George McKay: US\$17.95 Verso: (800) 634 7064, +1 (212) 244 3336.

## Hacking the Family Tree

**O**ur ancestors fled the Old World to leave history behind, becoming new people in a new land. As a child of immigrants, I've been seeking to reclaim my lost past by searching library archives for obscure faded photographs, names scrambled at Ellis Island, and birth sites. The *Family Tree Maker Deluxe II* CD-ROM makes this digging a much more manageable task.

*Family Tree Maker* consists of preformatted pages you fill in, and an archival database of historical records. It streamlines the work of constructing a family tree and figuring out intricate interconnections. You can start with any member of your family, entering all of their statistical particulars into a form — such as where and when they were born, died, and married, and the names of their children. Once you've made an entry, the program remembers the information. Type the first letter of a word in corresponding boxes and your first saved reply is automatically entered. As you enter the same last names and locales over and over, this well-designed



Family trees take root.

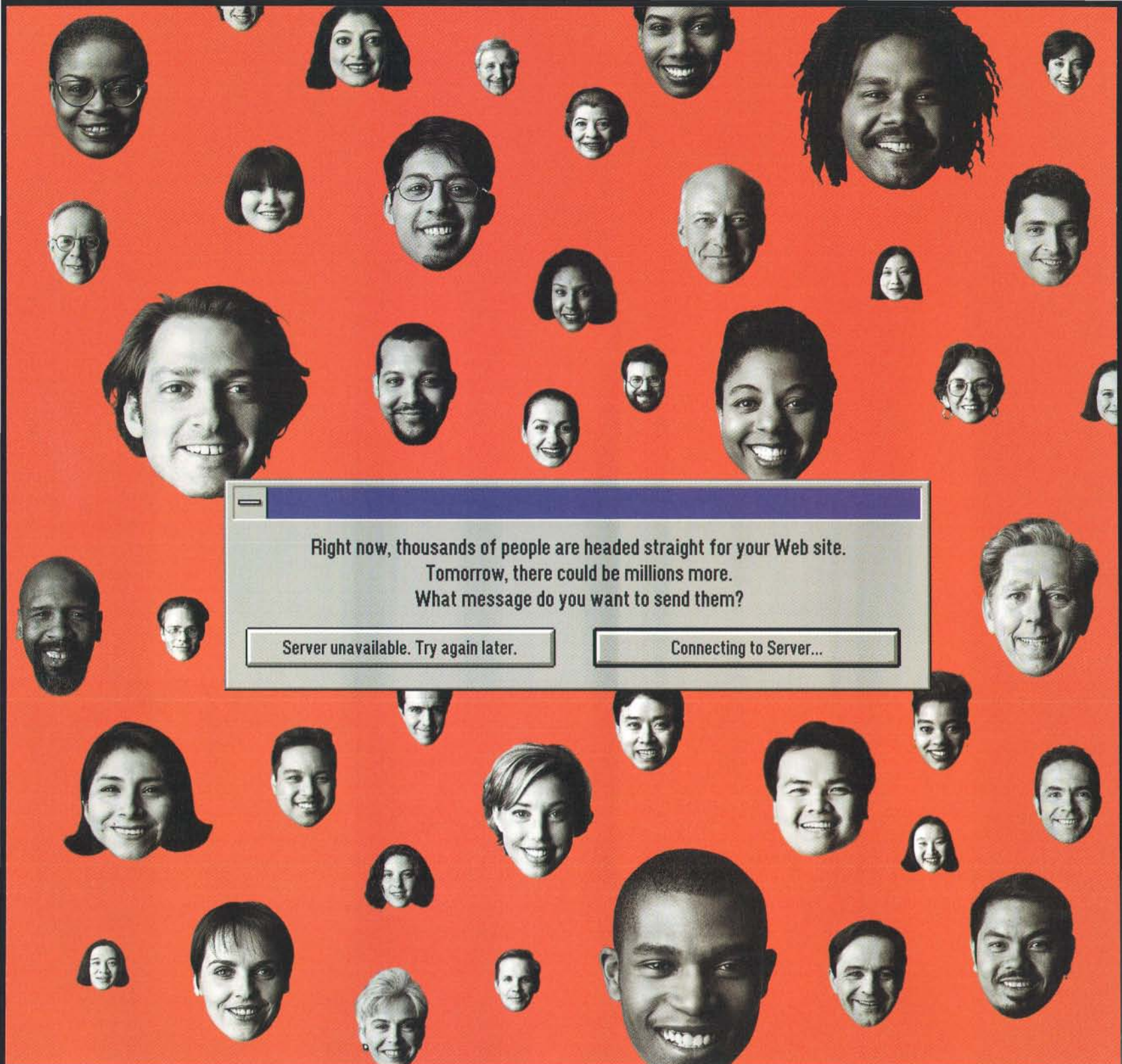
time-saver makes the process zip right along.

One of the most valuable features for genealogy researchers is the Social Security archives, listing US death benefits records from 1937 to 1993. Find the right match and click on it to transfer all of the data to your tree, including dates for birth and death, last known state of residence, and zip code. I found many of my relatives whom no one in the family had any specific information for, and easily popped their records into my file to build up my tree.

I was disappointed *Family Tree* couldn't help me find relatives who weren't in the Social Security archive. But a built-in link to a Web site led me to genealogy sites all over the Net. These got me pointed in the right direction to find relatives further back on my lineage. Still, technology hasn't caught up with genealogy research: to get most historical data you'll need to write for information or visit genealogy libraries and read dusty, old-fashioned microfilm. — Lynn Ginsburg

*Family Tree Maker Deluxe Edition II* CD-ROM. US\$89.99. Broderbund Software: (800) 474 8696, +1 (415) 382 4770, fax +1 (415) 382 4419, on the Web at [www.familytreemaker.com/](http://www.familytreemaker.com/).





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## STREAM A LITTLE STREAM

While the Web has certainly exploded with multimedia, whether this has enriched the experience remains in question. Sure, Shockwave is cute, but the download is brutal. Bandwidth limitations have been pushed aside for flashier presentations. And while early CD-ROM content could be optimized for the hardware's slow data throughput, only RealAudio currently offers a scalable, data-streaming format for online multimedia. That's great for audio, but what about for graphics?

Narrative Communications may have solved the problem. The Waltham, Massachusetts, company has developed a suite of tools for streaming multimedia content over the Web. Shockwave's salad days are over.

The Narrative suite includes three software components: Enliven Producer, Enliven Server, and Enliven Viewer. The viewer works client-side as a Netscape plug-in, an ActiveX component, a Mosaic helper app, or a stand-alone application. The server allows you to stream Enliven content. And the heart of the sys-

tem, Producer, rebuilds your content using the program's object-streaming technology, allowing easy, object-by-object transfer over the wires.

Producer will import popular file formats such as Director and should be extensible as new APIs are developed (using the Enliven SDK). After reading the different objects in a file, Producer performs a media-specific compression, outputting the most efficient object file sizes for streaming. You, the developer, specify the order in which objects should be streamed, so the background shows up before the ending credits.

It might not seem like that large of a leap, but by breaking what might normally be a very big file into several small objects, you can offer users a much richer file with less danger of losing them in what used to be a grueling download. For example, a 2-Mbyte Director file might be compressed to around 400 Kbytes and then streamed over a 28.8-Kbps modem. The wait? Around 20 seconds before the background and objects begin loading, and the file is active once it appears. Granted, not everything in the file will work immediately, but a surfer who's clicking is a surfer you haven't lost to the bandwidth wars. — Tim Barkow

Release: Late Summer. Narrative Communications Corp.: +1 (617) 290 5300, [www.narrative.com/](http://www.narrative.com/).



**Bill's 3-D** Microsoft continues its surge into the graphics arena with the release of Softimage 3D Version 3.5. This high-end production tool offers the magic of leading-edge modeling, animation, and rendering techniques to systems running Windows NT. No longer will you have to plunk down the cash for SGI iron to build professional-quality 3-D. Dare we say "Good work, Bill"? Release: August. Softimage: (800) 387 2559, +1 (514) 845 1636, [www.softimage.com/](http://www.softimage.com/).

**Sony's Making PCs** With MPEG, 3-D graphics acceleration, 28.8-Kbps modem, and DSVD support, we may actually have a contender here. Release: August/September. Sony Information Technologies of America: (800) 352 7669.



**Gabriel's Next** Peter Gabriel's *Eve* CD-ROM looks to be an interesting fusion of art, technology, and — of course — music. With the work of Helen Chadwick, Cathy de Monchaux, Yayoi Kusama, and Nils-Udo, the experience should be nothing less than interactive. Release: September. Starwave Corp.: (800) 457 8646, +1 (206) 957 2000.



**JUST OUTTA BETA**

**Web Learning** The eZone is a Web-based learning tool that combines online courses, computer books, and mentoring assistance via email. The first courses include Web site development and programming. Should be an interesting experiment in continuing education. Release: September. Waite Group Press: (800) 428 5331, +1 (415) 924 2575, [www.waite.com/ezone/](http://www.waite.com/ezone/).



**Not E.T.** Developed by HaiKu Studios, *Down in the Dumps* is a three-disc CD-ROM game unlike any you've seen — one locale is a party with lice on a bum's head. The pitch? Tiny aliens crash in a dump, and you help them repair their ship so they can return home. Release: September. Phillips Media Games: (800) 883 3767, [www.phillipsmedia.com/media/games/](http://www.phillipsmedia.com/media/games/).

**Mo' Mario** Nintendo 64 has reached American shores. The graphics and gameplay are great; the controller is almost genius. As Dvorak says, "Buy it!" Release: September. Nintendo of America: +1 (206) 882 2040, [www.nintendo.com/](http://www.nintendo.com/).

**Walt's Legacy** What would summer be like without a new "classic" Disney animated feature or, for that matter, a Disney Animated Storybook CD-ROM? *The Hunchback of Notre Dame* continues the empire's foray into interactive entertainment ... or was that edutainment? I always forget. Release: Fall. Disney Interactive: (800) 900 9234.



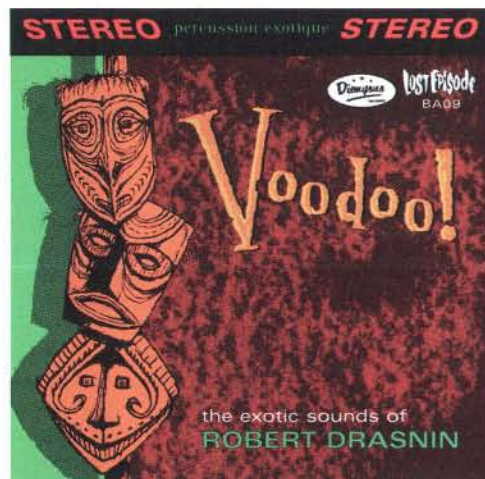


## Robert Drasnin

Voodoo  
Dionysus Records  
Access Code 1209

For years, cocktail exotica (à la Martin Denny or Juan Esquivel) turned up only at garage sales. Then Rhino released a CD compilation of Denny's tunes, soon followed by Esquivel's rediscovery, the lounge music retro era, and numerous "bachelor-pad" compilations featuring tiki swing and other such '60s fluff.

Yet, one classic blue-ice-cube recording, Robert Drasnin's *Voodoo*, was nearly lost forever. Originally released as *Percussion Exotique*, *Voodoo* was a lark, conceived as a toss-off to cash in on the craze. It cycled quickly to the used stacks despite the quality of composition and execution, its pieces comparable to the best Denny tunes. (After its release, Drasnin was tapped for arrangements on Denny's great *Latin Village* LP.) The original master tapes slipped into the great void, and the album might've been lost



forever had someone not discovered a mint-condition copy in a cutout bin. How good is *Voodoo*? I'm thinking every newborn child should be issued a copy.

Drasnin cuts through existential ennui and tells you the truth about paradise. The crazy-coconut percussion of the title cut is worth the price of admission; "Chant of the Moon" features spectral vocals against harp, flute, and popping bass – you can hear the moonlight on the ocean, the waves washing the shore; "Desiree" feels like you've joined Perez Prado on the glass-bottom boat, the percussionistas' deep monkey-walk vibes and ethereal echo driving its melody along down the river. And "Enchantment" closes the CD with sonorous flute that washes you happily out to sea.

Operating instructions: before you play *Voodoo*, take a long swim, get yourself a little sunburn, burn some incense, and kick back with a piña colada. Oh, and don't forget the passion flower.

—Jon Lebkowsky

## Altered Beats

Assassin Knowledge  
of the Remanipulated  
Axiom

Access Code 1210

A necromancer's work is never done, and Bill Laswell's latest compilation evokes the mystical art of the DJ, a modern whirling dervish whose instrument provides a perfect vehicle for the superproducer's ambient-dub-funk-world-fusion. The undisputed king of R&D (that's *rhythm and deconstruction*), Laswell and his minions teach Black Music: Ancient to the Future like nobody since the Art Ensemble of Chicago. Turntables are instruments for brothers of many colors, and technology rules the new school. Jazz is the teacher, funk is the preacher. Dig? —Mitch Myers



MATTHEW SHIPP

## Matthew Shipp

Symbol Systems  
No More

Access Code 1214

New York-based jazz pianist Matthew Shipp creates loose, textural grooves, passionately concocting a highly personal language with a spiritual connection to Cecil Taylor. Shipp most recently lent his talent to rising jazz artists like David S. Ware and William Parker and is now etching out a place as a formidable soloist. With *Symbol Systems*, he alternates free yet intensely manic grooves with compelling melodies that rise and fall with passion and drama, tapping directly into the primary elements that make him a prominent figure in the post-bop jazz scene.

—Rita M. Johnson

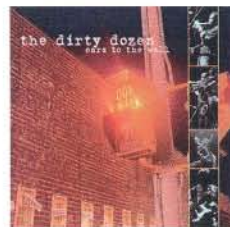
## The Dirty Dozen

Ears to the Wall  
Mammoth Records

Access Code 1211

On Dirty Dozen's most recent rabidly exuberant release, the New Orleans-bred octet has removed "Brass Band" from its moniker and added piano keys to its repertoire, while retaining its celebrated sousaphone and its flair for unique musical manifestations. *Ears to the Wall* is a fluid and playful collective of jazz-based compositions footnoted with funk and R&B extracts. The Dirty Dozen's elastic style – traditional arrangements teamed with street zeal – highlights its agile skill at euphonic maneuvering, and spurs new sensations of rhythmic arousal.

—Allison Diamond



## Tortoise

Millions Now Living  
Will Never Die

Thrill Jockey Records

Access Code 1215

Like predecessors Faust, Can, and Neu!, Tortoise shares a knack for turning musical references into its own aural galaxy of original ideas. Housed under one shell are Eleventh Dream Day's Doug McCombs, Tar Babies' Dan Bitney, Slint's David Pajo and John McIntyre; their names, however, are the only *idée fixe* for a band whose acumen comes from years of improvising. From the enigmatic opener, "Djed," to the final "Along the Banks of Rivers," this is a reinventive follow-up to *Rhythms, Resolutions & Clusters*. —Jennie Ruggles

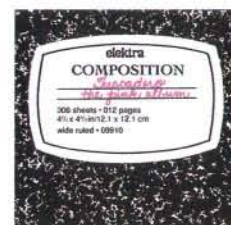
## Various Artists

Czeching In  
Skoda Records

Access Code 1212

Seems like *Czeching In*'s compilers would have us believe that Eastern European- and Slovakian-born rock music – far from evoking the darkness and melancholy one might expect – mainly echo Western alternative pop. These bright, often whimsical tracks vary stylistically from Afro-Cuban groove (reminiscent of Herbie Hancock's "Watermelon Man") and ska beats to clamor worthy of Captain Beefheart and a jangle-pop-with-a-touch-of-Liz Phair affair. *Czeching In*: the perfect conversation piece and dance album for all your hip party guests who prefer their music from "elsewhere."

—Karen Eng



## Tuscadereo

The Pink Album  
Elektra

Access Code 1216

Why major record companies maintain that luring cute, mildly talented Lolla-punk bands will improve their roster I don't know, but Washington, DC's Tuscadereo is here to do just that. Originally released in 1994 on indie label Teen Beat, *Pink* conjures images of the suits in their boardroom at MegaRecords, seeking to placate a generation fixated on TV sitcoms and post feminism. Back in '94, a cute quartet singing about "Happy Days" and model horses was cool. Hey, *Sassy* loved it! Trouble is, I've heard this all before.

Smells like teen leftovers. —Kristy O'Rell

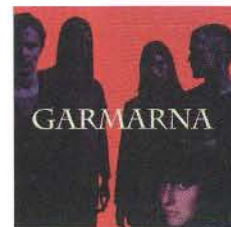
## Garmarna

God's Musicians  
Omnium

Access Code 1213

Sweden's Garmarna exists at the point where the Renaissance touches the 21st century, where hurdy-gurdies, Jew's harps, and samplers all edgily coexist. *God's Musicians* is the folk music of the modern age, fronted by Emma Hårdelin's gloriously eerie voice. There's a macabre, medieval creakiness to the material, both original and traditional, that lets its deepest shadows peer through; if Bergman were to remake *The Seventh Seal* today, this would be his soundtrack. Haunted as Macbeth, relentless as a Viking invasion, this album snares your soul and won't give it back.

—Chris Nickson



## Main

Hz  
Beggars Banquet

Access Code 1217

Though "The Noise of Carpet" is a Stereolab song, the phrase deftly captures the highly impressionistic "music" of Main. This twosome uses electric guitars as sonic conduits, coaxing shapeless whirs, buzzes, and clatters from the instruments. One member's past association with British droners Loop has little bearing on the content of this two-CD release: compiling *Main*'s six 1995 EPs, *Hz* documents the group's disregard for musical orthodoxies. The results provide an expressway to the psyche, an isolation tank in gorgeous gatefold packaging.

—James Sullivan



## Microwave o' the Month



### Men at Work

*Contraband: The Best of Men at Work*  
Columbia Legacy

You're at a lite-beer bust at an unfamiliar house in the 'burbs: someone who's imbibed one too many pulls out *Contraband*, performs a clumsy air-guitar dance in Top-Siders, and starts pelting the guests with Vegemite. *Quelle horreur!* — Ted Roberts •

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of the artist)	5-Softer
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**A**t the beginning of each music review, you'll find a four-digit code for each album. To hear sample cuts, dial the 900 number above, entering this code when prompted. You'll hear up to three minutes of music, at 95 cents per minute. To fast forward, punch 3; for louder volume, 4; softer, 5. To use Music Access, you must be 18, have a touch-tone phone, and dial from the US.

Code	Artist and Title
1209	Robert Drasnin, <i>Voodoo</i>
1210	Altered Beats, <i>Assassin Knowledges of the Remanipulated</i>
1211	The Dirty Dozen, <i>Ears to the Wall</i>
1212	Various Artists, <i>Czeching In</i>
1213	Garmarna, <i>God's Musicians</i>
1214	Matthew Shipp, <i>Symbol Systems</i>
1215	Tortoise, <i>Millions Now Living Will Never Die</i>
1216	Tuscadereo, <i>The Pink Album</i>
1217	Main, <i>H2</i>

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## Music, Maestro!

She's just under a year and crawling around the house big time. She scrambles into the kitchen, opens a drawer and Bang! Bliinnng! She's taking her first steps as a budding musician. Fortunately for Forsight, it's a rare music teacher who can take much of this.

*The Secret Score* lets kids of all ages explore cupboards, music rooms, and 25 environments chockablock with instruments, noisemakers, and musical toys. The intuitive interface with child-friendly cursor icons offers windows into members of the brass, woodwind, percussion, and string families.

Starting at the Bongolow, a high-tech home for way-



## Harmonic kidvergence.

ward percussion instruments, you click to open the first door to the kitchen. Glasses with different water levels offer instant insight into the relationship between size, shape, and sound. Kids can manipulate levels to create harmonies. A mysterious conductor pops up from time to time to guide users through this sonic village.

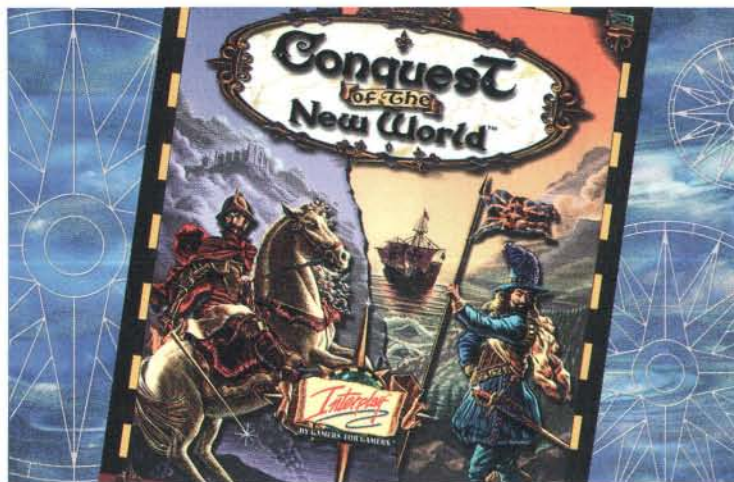
*The Secret Score* is no substitute for music teachers, but it is a nifty learning tool for budding bongers, bangers, and other aspiring musickers. —Kimi Eastham

*The Secret Score*: US\$40. Forsight: +1 (301) 816 4900, fax +1 (301) 816 7902, email [forsight1@aol.com](mailto:forsight1@aol.com).

## The New World, Take Two

Ever fancied you'd have done a better job settling America if only you'd gotten here first? Know you would have had some choice words for the Queen and they wouldn't have been "Your Majesty"? Whatever your inclination, now you have the chance.

*Conquest of the New World*, an elegant CD-ROM product from Interplay Productions and Quicksilver Software, is an explore-and-conquer colony simulator with historical detail. Playable as solo or networked as a six-player competition, it focuses on the empire builders of England, Spain, France, Portugal, and Holland, circa 1500. Players embark on their missions with a ship's worth of explorers, colonists, leaders, and footsoldier/calvary units. Management of a fledgling colony involves the construction and maintenance of individual structures such as docks, mines, the all-important tavern, and, of course, the local church (complete with a fire-and-brimstone pastor and righteous lightning flickering overhead). The colony can be customized to the slightest whim of the player — craft a freemen utopia, disastrous aborted expedition, or strangling, militaristic arm of the Crown overseas. The multiplayer games allow for a wealth of play options, including trade and diplomacy



## Long live the Queen! — or whomever.

between colonies and the mother country, a customizable world generator, player-to-player messaging, and the research and development of new technologies.

Of course, when all that is modern and civilized proves ineffective there is always the military option. Whereas many empire-building games offer only the most unsatisfying, mathematical methods of resolving physical conflict, *Conquest of the New World* actually gives the player active influence over military operations, with squad-level combat occurring on a battle grid filled with animated troops that shoot, retreat, scream, and die in various entertaining ways.

The main attraction here is style: the graphics evoke mental images of yellowed, curling nautical maps adorned with ornamental compasses and scripted phrases such as "Here There Be Sarpeants." While more than meaty enough to satisfy the longtime "God-game" player, *Conquest of the New World* also sports nifty online help features and tutorials, making the game a worthwhile purchase for those new to the simulation experience. Long live the Queen! — or whomever. —Chris Hudak

*Conquest of the New World* CD-ROM for PC: US\$49.95. Interplay Productions: (800) 468 3775, +1 (714) 553 6678, fax +1 (714) 553 1406, on the Web at [www.interplay.com/](http://www.interplay.com/).

## Cinema on the Couch

*Suture*, a quirky, independent 1993 film distributed by ICA Video, tries to do for French psychoanalyst Jacques Lacan what Hitchcock did for Freud. The plot is yer basic film noir — fiendish mandarin Vincent Towers invites his identical twin brother, Clay, to live with him. The brothers have long been estranged, and no one except Vincent knows of Clay's existence. However, Clay is being set up: Vincent is planning to kill him and assume his identity to avoid arrest for the murder of their father. Although Clay survives the car bomb meant to wipe him out, he loses his memory, and doctors reconstruct his face under the assumption that he is Vincent (dot dot dot).

What makes the film so notable is that while Vincent is a pasty WASP, Clay is a black man, a juxtaposition that is made even more striking by the film's beautiful black-and-white cinematography. In the film's world, the two men appear identical, but scenes reveal to the audience how black people are perceived — and the way they perceive them-



Black and white and Lacan all over.

selves — in a predominantly white culture.

The key Lacanian concepts at work are that of the mirror stage and the gap between representation and represented (another reason for the black actor in a "white" role). For Lacan, the individual is born with no coherent, essential identity. Instead, the concept of self is constructed by infants when they see, literally or metaphorically, their image in a mirror. Whatever this image, it persists. So in *Suture*, following the loss of his memory/identity, Clay rebuilds his ego in the "mirror" of his brother.

The film is directed by Scott McGehee and David Siegel, both first-time filmmakers with academic backgrounds. Unfortunately, this shows — *Suture* relies heavily on concept. Hitchcock, by contrast, never let big ideas get in the way of plot. *Suture* is an interesting and visually absorbing movie, but if you're less of a psychoanalysis freak than me, you might not find it as exciting. By the way, did I ever tell you about my childhood? —James Flint

*Suture*, on ICA Video: US\$14.98. Distributed by Evergreen Entertainment. Available at video stores.



## Freeware Filmmaker

When HTML arrived, it helped bridge the disparity between those who programmed and those who wished they did. At last, there was a language accessible and powerful enough for almost anybody to use. Then Java forced us wannabe Web wizards to recall code we swore to abandon.

Sure, Java provides a lot of functionality, but as far as film clips and animation are concerned, there's a much simpler way to embed files into a Web page that won't leave you digging through programming manuals. It's a freeware program by Yves Piguet called GifBuilder. For those blessed with a Mac, it converts QuickTime files

## READ ME On the bookshelves of the digerati

**ALLEE WILLIS**, a songwriter and multimedia artist, collects '50s kitsch and is creating a Web environment called Willisville.

**Bread Sculpture: The Edible Art**, by Ann Weisman. "I am very into how-to books, though they don't even need to be laid out that way. This one is all illustrations and recipes – you make the dough for the sculptures. There is one in here that looks like *The Thinker* but it's made out of pumpernickel. I love that you can't figure out how the author got funded to produce this. I have not taken up bread sculpting though we drew on this heavily in Willisville."

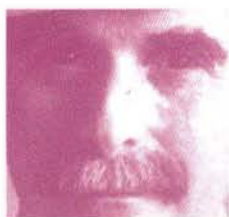
**Television**. "I have 23 TVs and they are always on. I'll watch almost anything, but I am most intrigued by the process of media: Who advertises which products on which show? Which shows compete against each other in the same time slot? I am much more interested in the process than I am in the finished product."

**HOWARD RHEINGOLD** wrote the book on virtual community. Check out his colorful *Brainstorms* ([www.well.com/users/hlr/](http://www.well.com/users/hlr/)) for links to his weekly column, "Tomorrow," and his new shoes.

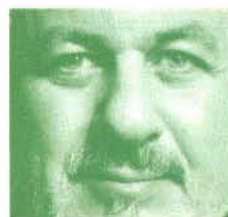
**The History and Power of Writing**, by Henri-Jean Martin. "Writing is the original information technology. The alphabet is closely allied to theocracy, organized military, and slavery, with fitting people into slots and bureaucratization. The book broadened my thoughts on the critique of technology. Now I'm skeptical of critiques that begin with computers: you have to reject alphabets as well."



Allee Willis



Howard Rheingold



Richard Saul Wurman

## Get GIF'd.

so each frame is transformed into a GIF that most browsers can view as part of a page. Pull together a whole bunch of PICT or GIF files and create an animation. Editing "Gif-Movies" couldn't be simpler: you get a freeze-frame of every shot, plus stats on its duration and size, which you can manipulate using a simple scrollbar. All this with no code, just a GIF89 – a graphic that any server can handle. The only drawback is that there's no sound capability yet.

Java has its purpose. But for those of us without a compiler in our cranium, Piguet's GifBuilder is a welcome addition to the Web developer's arsenal. – Andrew Cockwell

GifBuilder for Mac, by Yves Piguet: freeware. Yves Piguet: email [piguet@ia.epfl.ch](mailto:piguet@ia.epfl.ch).

**The Inward Garden**, by Julie Moir Messervy. "This is a woman who fell in love with landscape gardening as a contemplative craft. If you spend the week in front of a computer, you really have to get outside and get your hands in the dirt. Gardening takes years and decades rather than microseconds. It slows me down and makes me pay attention. You have to be present. If your mind wanders while you are pruning roses, they'll rip your flesh."

**RICHARD SAUL WURMAN**, a Renaissance man of the information age, organizes TED – the Technology, Entertainment & Design conference.

**The Discoverers**, by Daniel Boorstin. "The second chapter – on the history of time – is the best essay I've ever read. For instance, the invention of the portable clock changed civilization; it allowed people to navigate across oceans. Time will be the subtheme that ties together the 10th and last TED conference in 2000."

"I also read **catalogs** extensively. Catalogs tell you exactly what people are buying, what fascinates people, how cooking changes ... that gives me a great sense of trends. I put my name on every mailing list. I mean, the obscenity of the stuff is amazing! Whether it's that Neiman Marcus quarterly or a gun publication, reading catalogs is not a trivial act in our society. It's more accurate information than anything on the Net."

**Good Benito**, by Alan Lightman. "You can read this novella in about four minutes, but it's not nearly as good as *Einstein's Dreams*. It's the semi-autobiographical story of a young student, his fascination with physics, and the foibles of his life. But he's rather a nonhero. I lost interest halfway through."

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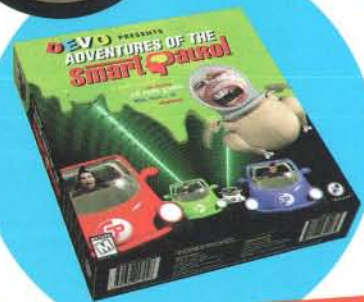


1980: They Wired Pop Culture

# 1996: Time To Get Re-Wired

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### 1. Retrosoftware

The emerging retrosoftware trend – users embracing old software packages and refusing to let go – isn't brand-new. Almost five years ago, Rudy VanderLans, editor of *Emigre* magazine, proclaimed his allegiance to an obsolete version of Ready, Set, Go! His point was that it's too easy to get distracted by new features and forget about the art. But today, it's not just artists who are questioning the need to upgrade their tools. It's people tired of the ceaseless stream of Netscape updates; it's people who stumble away from the bloated Word 6.0 and go back to Word 4.0. Their slogan? We're mad as hell, and we're not going to upgrade anymore!

### 2. Personal Satellite Phones

With the April launch of the first of four Inmarsat-3 satellites, we have finally entered the age of anytime, anywhere communications. The newest status symbol is the Planet 1, a US\$3,000 personal satellite phone from Comsat. (Bad news for the status conscious: it weighs almost 6 pounds.) But with airtime costing around \$3 a minute, far too expensive for most of the 5 billion potential users, satellite phone "cloning" may become the most important skill in the developing world.

This Month's Overhyped Memes	Hype Level	Position Last Month	Expected Lifetime
Retrosoftware	👉	0	5 months
Personal Satellite Phones	👉	0	6 months
Cyberlaunders	👉	👉	11 months
Net Games	👉	👉	8 months
Weird Web Metaphors	👉	👉	6 months

0 = Embryonic meme 👉 = Meme on the rise 👉 = Mass-media meme 📄 = About to die from overexposure

### HYPE LIST



### 3. Cyberlaunders

The financial community's newest bogeyman is the drug kingpin who walks across the border with a tiny smartcard worth millions of dollars. But the hype about cyberlaunders may conceal a more venal motive. The obvious way to prevent cyberlaunders is by putting a cap on the amount smartcards can hold. (During the Atlanta Olympics, for example, the limit will be US\$100.) But this scheme also richly rewards banks. The reason is "float" – the unspent value on cards that are lost or discarded. Small denomination cards, banks know, mean more float.

### 4. Net Games

People forget that before Internet MUDs became chat spaces they were D&D-style game worlds where users battled it out. The fact that most MUDders quickly grew bored with violence is an optimistic sign for humanity – but not for Internet game companies like Mpath Interactive. But these new games may still have a chance. MUD users are predominately college students, while the new games seem targeted at bored white-collar workers – a far more blood-thirsty crowd.

### 5. Weird Web Metaphors

Web site designers are suffering from the same confusion that has long plagued architects: they can't decide if they are artists or craftspeople. On one hand, a Web site should be easy to navigate. That requires simple organization and transparent labeling. On the other hand, to get attention, a Web site must be innovative and come up with new navigation metaphors. The result is something like Prodigy's Stim site ([www.stim.com/](http://www.stim.com/)), which is sensibly organized – if you can get beyond the rococo glitz and weird names. Watch for a Bauhaus backlash.

– Steve G. Steinberg ([hype-list@wired.com](mailto:hype-list@wired.com))

### Satellite with a View

**E**arthscapes in Time hits on a good idea: compare satellite views of Earth over time to see how the planet is changing. Especially as the CD-ROM lets you overlay maps on the images so you can tell where you're looking.

The ecological trouble spots shown on the program are well chosen, including the drying of the Aral Sea, changes in the Brazilian rain forest, damage to the Everglades and the Larsen ice shelf, and the aftermath of the Mount Saint Helens's volcano explosion. You can even see changes in suburban sprawl along the New York-Philadelphia axis. With Version 2.0, park yourself at planet surface level and not only get a satellite view of, say, the Aral Sea receding but watch it from



### Far out.

the shoreline, as well.

The interface is intuitive and well thought-out, with prompts and comments – not to mention notes you can add yourself. The installation software is exceptionally considerate: it asks whether you want to use 6 Mbyte, 1 Mbyte, or a mere 4 Kbyte of hard-disk space for the software (the more you use, the faster it runs).

My only disappointment is that I'd like to see close-ups of, and be able to zoom in on, more areas than the two dozen or so covered on the disc. – Ivan Berger

*Earthscapes in Time* CD-ROM: US\$49.95. Now What Software: (800) 322 1954, +1 (415) 394 5015, fax +1 (415) 394 5035, email [smallblue@aol.com](mailto:smallblue@aol.com).



## Street Cred Contributors

**Ivan Berger**, technical editor of *Audio Magazine*, has been writing about audio and other aspects of electronics since 1962. In 1978, as an Altair owner, he was one of the first with a home computer.

**Stewart Brand** is a co-founder of The Well, the Hackers' Conference, and the Global Business Network. His books, *The Media Lab* (1987) and *How Buildings Learn* (1994), are still in print.

**Andrew Cockwell** is in his honors year at Queen's University in Canada where he can usually be found working too hard and sleeping too little, worshipping the god that is Gunner.

**Jane Dark** is the editor, publisher, and sole contributor to *sugar high!*, the lowbrower-than-thou bible of pop music.

**Allison Diamond** ([allison@well.com](mailto:allison@well.com)) has contributed to *Detour*, *Plazm*, and *BAM*. She resists temptation by staying in site.

**Kimi Eastham** is a Maryland-based freelance writer who contributes to *Wired*, *Tokyo Journal*, *Mangajin*, and other publications in the US and Japan.

**James Flint** ([flint@wired.com.uk](mailto:flint@wired.com.uk)) sits on a swivel chair in the center of the *Wired* UK office. This gives him a perfect 360-degree view and allows him to erect advanced paranoid structures at will.

**Karen Eng** ([kfeng@igc.apc.org](mailto:kfeng@igc.apc.org)) lives in Berkeley, California, with Esmé the toad and Sebastian the snake. She has been spotted in the *Wired* offices posing as a freelance copy editor.

**Lynn Ginsburg** ([ginsburg@csd.net](mailto:ginsburg@csd.net)) has credits all over the place, including soap operas, off-Broadway plays, multimedia reviews, and techno-geek personality profiles. She lives in Boulder, Colorado.

**Eddie Glaser** has been a full-time kid since September of 1983. He's been using computers since he was 6 months old, when he discovered the Print command on his father's keyboard.

**Phil Hall** is an okapi at the Bronx Zoo.

**Chris Hudak** ([gametheory@aol.com](mailto:gametheory@aol.com)) travels, plays computer games, shoots pool, drinks rather too much, and somehow gets paid for it.

**Rita M. Johnson** ([zymyatin@earthlink.net](mailto:zymyatin@earthlink.net)) is a Missouri native presently residing in Los Angeles. Her writing has appeared in *LA Weekly*, *Sky*, *Dazed & Confused*, and *Request*.

**Marc Laidlaw** is the author of *Dad's Nuke*, *The 37th Mandala*, and the forthcoming *The Third Force: A Novel of Gadget*.

**Jon Lebkowsky** ([joni@well.com](mailto:joni@well.com)) is former CEO of FringeWare Inc. and current moderator of the Electronic Frontiers Forum at HotWired. He lives in Austin, Texas.

**Mitch Myers** ([comeback@mcs.com](mailto:comeback@mcs.com)) is a psychologist and freelance writer. He lives in Chicago and Manhattan and spends a lot of time on the phone.

**Chris Nickson** ([73633.1471@compuserve.com](mailto:73633.1471@compuserve.com)) lives in Seattle. However, as he doesn't drink coffee, he may be asked to leave soon.

**Jennie Ruggles** ([jeneric@sirius.com](mailto:jeneric@sirius.com)) has written about music for the last few years. She agrees with David Byrne, who said that "writing about music is like dancing about architecture."

**James Sullivan** ([onion65@aol.com](mailto:onion65@aol.com)) is a freelance advocate of Yogi Berra's dictum, "you can observe a lot by watching."

**Brad Wieners** ([braddog@wired.com](mailto:braddog@wired.com)), an editor at *HardWired*, also writes for *Details* and *TimeOut Net*, clowns around in *Salon's* "Media Circus," and mouths off at *Suck*.

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IT'S TIME TO



GET CONNECTED



## Poetry? On the Net?

I learned to loathe Quentin Tarantino the night I watched him, framed by a silicon-studded horizon live from Cannes, sputter incredulously, "You can't write *poetry* on a *computer*." Well, I'm sure Mr. Nonlinear Power Ranger speaks for a lot of analog *artistes* out there who just can't stomach the notion of a lyrical byte. Admittedly, I've wondered whether the muse travels more fluidly from hand to pen to paper than, say, from hand to keyboard to screen; or if a poem's font usage affects its cadence and meaning (the grand poo-bahs at the Iowa Writers' Workshop deemed these concerns to be *majorly* superfluous). But such pronouncements seem ripely superstitious (a trait cultivated by writers paranoid they will never again produce work as inspired as their latest effort), and impervious to the possibly schwag effect that *change* can have on one's creativity.

Tarantino's jive also points to a widely held belief that poetry – allegedly the least economically lucrative and thus least corruptible of the arts – should be relegated to a kind of Baroque Biosphere, where slim volumes of verse brood silently and writers need not worry about the fickle tastes of the vox populi. But slutty cyberspace, where the speech is cheap and the homepages are always open, threatens to return the art form to a prime-time bandwidth.

"It is difficult / to get the news from poems / yet men die miserably every day / for lack of what is found there," William Carlos Williams wrote. It's easy to forget that the first American newspapers were rife with poetry: our national anthem was initially read as a poem, appearing in the *Baltimore American* in 1814; Abraham Lincoln's first byline was for a poem printed in a newspaper; and the only verse Emily Dickinson published in her lifetime graced the pages of the *Springfield Register*.

So what happened? Robert Hass, US poet laureate, points out that "almost as soon as widespread literacy was achieved in the United States, poetry got lost as a common possession." Perhaps this explains the voluptuous metropolis of poetry being built on the Internet by geeks, academics, anarchists, cowboys (check out

[www.westfolk.org/](http://www.westfolk.org/)) – anyone who's ever scribbled a haiku or edited a lit mag seems to have staked a claim.

But not everyone is convinced that high hit rates equal poetic success. "I'd rather have just one person who reads and feels my work deeply," says the Nobel Prize-winning poet Derek Walcott ([dewey.rug.ac.be/NewFriday/NewStructureFriday/Walcott1.html](http://dewey.rug.ac.be/NewFriday/NewStructureFriday/Walcott1.html)), "than hundreds of thousands who read it but can't feel it." Granted, most Web sites slap a riot of poems into a Chinese-water-torture font and leave you to suffer. But others, such as *The Electronic Poetry Center* ([wings.buffalo.edu/epc/](http://wings.buffalo.edu/epc/)) and *The Internet Poetry Archive* ([sunsite.unc.edu/dykki/poetry/home.html](http://sunsite.unc.edu/dykki/poetry/home.html)), get major props for their innovative use of the new media. Audio files of writers reading their poems often accompany text, photos, translations, and interviews. And for a stellar layout that really works line breaks, check out the *Oyster Boy Review* ([sunsite.unc.edu/ob/](http://sunsite.unc.edu/ob/)).

Rather have one pearl than a necklace of potatoes? Sign up for the *Occasional Screenful*, a mailing list that delivers a single poem to your mailbox every couple of weeks (email [listserv@netcom.com](mailto:listserv@netcom.com) with *subscribe occasional-screenful* as the only body text). Subscribers live in 40 different countries, and submissions come in from all over the globe, from Israel to Malaysia. Publisher Eugene Volokh claims "the Net is the technology of the future for literature. Lots of printed poetry magazines have only a few hundred subscribers and can barely stay afloat. We have more than 1,600 – and growing."

Whether or not verse finds an epic audience on the Net, you can bet that slangbangers and literati will always find new pages – paper or pixelated – on which to post their rhymes. "Poetry," wrote Don Marquis, "is what Milton saw when he went blind."  
– Tessa Rumsey ([tessa@wired.com](mailto:tessa@wired.com))



Shut up and read: *Oyster Boy Review* serves up bourbon-soaked stanzas and cyber-rhymes – poems for when you stop talking.





## One Nuclear Latte – To Go

Back when kids learned how to duck and cover before they learned how to play dodgeball, hawkish policymakers produced propaganda films to allay public fears, offering hope that hiding beneath a school desk could save your sorry ass from frying like bacon in a nuclear hellfire.

*The Atomic Cafe* turns these images inside out, using atomic-age agitprop to document the surreal reality of living under the looming threat of the bomb. Incorporating neither narration nor interviews, the 1982 film relies entirely on archival footage to prove that societal calm was maintained through a relentless campaign of blatant misinformation.

Jayne Loader's *Public Shelter* ([www.publicshelter.com/](http://www.publicshelter.com/)) chronicles the tireless research behind the film and the resulting CD-ROM. Not to be missed is the audio file of Bert the Turtle singing his version of the American classic, "Duck-and-Cover." Remember, when Bert says "Duck," you say "How low."

## Interactivism

Online speech had its day in court and won the first round, but the Communications Decency Act is a long way from dead. What to do while the case wends its way toward the Supremes? Why not violate the CDA with a flick of your mouse. Click on a button and three illegal files are sent to the Bob Dole campaign headquarters: illustrated instructions for the proper use of a condom; an excerpt from 1945, a novel (sort of steamy, but not really) written by Newt Gingrich; and a list of US abortion clinics (dissemination of abortion information on the Internet is specifically prohibited in the CDA). The CDA protest page can be found at [www.interactivism.com/](http://www.interactivism.com/). Of course, similar protests can always be sent to *president@whitehouse.gov*.



of a Satanic place on the Internet"—and to inform skeptics that Baal worship is more than ritual sacrifice and sex orgies.

## Funny You Should Mention That ...

Trivia fiends are crawling all over each other to find out exactly what *Mr. Smarty Pants Knows* ([www.auschron.com/mrpants/](http://www.auschron.com/mrpants/)). The *Austin Chronicle's* weekly column has become a repository for scads of utterly worthless yet irresistible facts. Organized into several convenient categories (among them Dinosaur Facts, Flan Facts, and Accordion Facts), this site will become a favorite destination of anyone: a) at work; b) dying to wow his or her friends down at the audiovisual club.

## The Prince of (Online) Darkness

"SWF, enjoys sacrifice, mutilation, cannibalism, and volatile destruction of mortal worlds. Loves bathing in goat's blood and drinking from human skulls...." Ah, what's a young devil worshiper to do?

Try the scores of Beelzebub-inspired groups that are jumping online. Offering Lucifer-friendly personals and books by Anton LaVey, these sites were created "to allow other Satanists the comfort

First go to *Hell: The Online Guide to Satanism* ([webpages.marshall.edu/~allen12/](http://webpages.marshall.edu/~allen12/)), where you can brush up on your Nine Satanic Statements or catch up on news of the Embassy of Lucifer, the Temple of Set, or the Bambini di Satana. Not a member? Take advantage of the online membership opportunities (membership card included) at the *Church of Satan* ([webpages.marshall.edu/~allen12/cos.html](http://webpages.marshall.edu/~allen12/cos.html)). Browse through the stacks at *Maledicta Books and Supplies* ([www.maledicta.com/](http://www.maledicta.com/)). Or track down Ken Rhodes's elusive *Grotto of the Wolf*, the only Satanic organization that exists exclusively in cyberspace.

Humor aside, most digital Satanists eschew the concept of worshipping the Christian devil and proclaim themselves a misunderstood lot. "The animal or human-sacrificing, ritual-abuse-practicing Satanist is a myth spawned by Hollywood and the religious right," writes one surfer.

Show some sympathy for the devil and let Lucifer into your URL. Even if you don't worship the Prince of Darkness, you'll have a hell of a time.



## Quality TV: Oxymoron, or Web Site?

Quality is not necessarily job one for TV sites on the Web; a quick Yahoo! search yields 29 Pamela Anderson-related sites and zip for cerebral *Murder One* star Daniel Benzali. But netizens who'd like to raise the level of what's on the tube should surf over to [www.vqt.com/](http://www.vqt.com/) and join *Viewers for Quality Television*.

Dorothy Swanson founded the Virginia-based nonprofit in 1984 out of her grassroots campaign to save *Cagney & Lacey* from cancellation. The group now endorses 13 prime-time series, from *Homicide: Life on the Street* and *The X-Files* to *Seinfeld* and *Frasier*, and draws a crowd of appreciative writers and stars to its annual convention. VQT's simple, text-heavy site includes information on endorsed series, how to join, and a campaign to save *Murder One* from the network ax.

Definitely not for the squeamish: wield the virtual scalpel and dissect a bovine eye at [netra.exploratorium.edu/learning\\_studio/cow\\_eye/index.html](http://netra.exploratorium.edu/learning_studio/cow_eye/index.html).



## HURL!

Seems the angstmongers at Northwestern Mutual Life have raised the frenzied Net stakes by designing a life-expectancy server, a Web site that is an overwrought surfer's worst nightmare. Their *Longevity Game* ([www.northwesternmutual.com:80/longevit/longevit.htm](http://www.northwesternmutual.com:80/longevit/longevit.htm)) will tell you when to start digging your grave – or at least provide a statistical profile of your possible time of death. At long last, you can compare your life span to the amount of time you spend loading useless Web pages. You may have no intention of living until, say, the suggested 73. Hell, you can always up your smoking habit; that way you'll end your life before you get suckered into playing another stoopid Web game designed by insurance professionals.

## Remembrance of Links Past

For your next literary fix, sample the highbrow shenanigans of *Proust Said That* ([www.well.com/user/vision/proust/](http://www.well.com/user/vision/proust/)). Each issue focuses on the life and work of the garrulous Marcel, but topics still roam playfully from bouillabaisse to Burning Man. Apart from being one of the quirkiest and smartest sites online, PST is also one of the very few that includes a recipe for Nesselrode pudding.

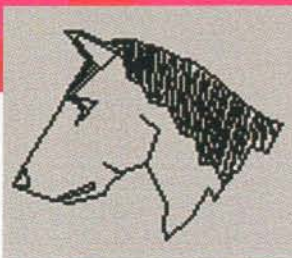
## Up against the Wall ... of Science

*American Science and Surplus* has a Web site (and catalog) that's chock-full of cool industrial, military, and educational stuff. You know what we're talking about: electric motors, lenses, backpacks, weather balloons, educational toys, weird foreign tools, you name it. And everything is way cheap. Snag a military-surplus sight for a grenade launcher, sealed in its original web-belt carrying case. The Army probably shelled out US\$50 to \$100 for it. Your price? Three stones. Greedily ogle Cyalume tubes, gas masks, a pile of lint brushes ... yours for practically nothing. Keep it up and someday you might even replace all the neat junk your mom sold at the yard sale while you were away at college. Surf to [www.sciplus.com/](http://www.sciplus.com/) and shop till you drop (or until you're caught in the crosshairs of that nightscope).

## And You Can't Lose It Under the Bed

Among the pantheon of great childhood toys, few can match the glory – and difficulty – of the Etch-A-Sketch. Now this most challenging of all artistic mediums has come to the Web. Venture, if you dare, to the place they call *Web-a-Sketch* ([www.digitalstuff.com/web-a-sketch/](http://www.digitalstuff.com/web-a-sketch/)).

The site itself is a beautiful tribute, right down to the bulletproof red plastic case. Just like the original, the Web version is tricky, time consuming, and difficult to master. And there is no going back. The Web-a-Sketch teaches what its predecessor did: in life, it's all or nothing. Instead of dials, you use the mouse to draw single lines, reloading with each click. One minor complaint: the Erase button, while effective, doesn't quite deliver the tactile satisfaction of hoisting that sucker and shaking it till you see stars.



Web-a-Sketch's elegant design lets you submit your sketches to weekly and monthly contests in the Gallery. You can view past Galleries week by week – some of the submissions are not to be

believed. Hats off to the genius behind this site; what's next? Operation, anyone?

## Random ASCII Art o' the Month

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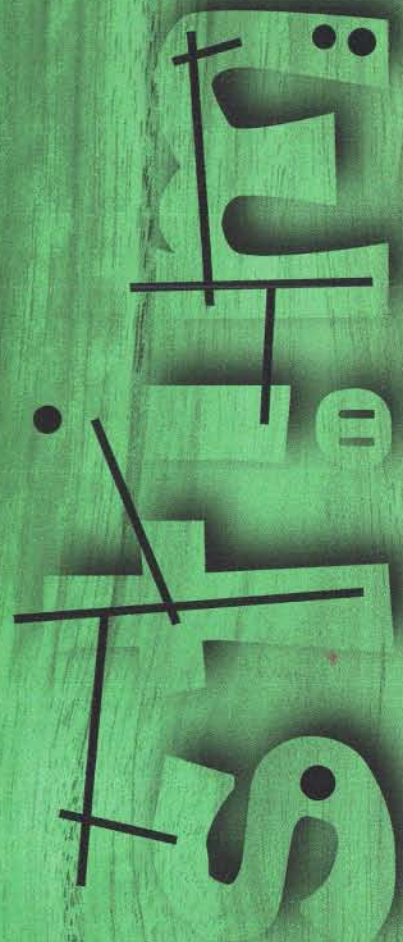
```

Big Robot monster I saw!

## Thanks to the Wired 4.09 Surf Team

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◀ 56 has been in steep decline for years.

That subset of Americans who still exercise their franchise – The Market, if you will – tends to be much older, whiter, and more socially conservative than the population in general. They live mostly in the suburbs, shop in malls, work for large organizations, and go to church on Sunday. Creatures of a mass society, living in a culture created by mass media. Genericans. Not a bad lot, really. Decent people, most of them, with good judgment – if that judgment were well informed.

And that's the problem. For most of The Market, reality is, as I say, almost entirely based on The World According to Television. This has been the case since the Kennedy-Nixon debates and will continue to be the case for some time. The World According to Television is not a reality that arises from direct experience with events or phenomena. It is a processed world, both eviscerated of context and artificially fortified toward no greater purpose than entrancing the audience.

But politics, as practiced, is pretty tedious fare. Not much of it can get through a machine that runs on the sensational. Thus, the political realities of Televisionland are not about monetary policies and

tax reform – or, indeed, any of the governmental issues that count – since these are all subjects that diminish the attention of the audience, and selling the attention of the audience to advertisers is all that television does. In the time since the Kennedy-Nixon debates, the organism of

**Easy opportunities are afforded for congresspersons to get a Web demo and learn about all that tricky stuff like email. Is it working? Not yet. Why? Because Congress represents Televisionland.**

television has learned a lot about which elements of the political process keep people locked in even through the ads. It learned a lot during Watergate and has been busily offering up “-gates” of one sort or another ever since. It has also learned that fear, violence, and sex all fertilize attention marvelously, so it continually churns up virtual demons and scandals that not only jolt the audience into paying attention, but

completely transform the political debate. Voters are now more concerned with imaginary threats than real ones, and so they elect representatives who will address these “problems” without regard to their existence.

It's become a hung loop. Consider the process behind the following familiar example. Looking to raise share and beat back the future, the media raise an imaginary problem, say, a cyber-tsunami of

online kiddie porn. Out in Televisionland, parents who have already been driven into a state of omniphobia by TV depictions of kidnappers, child molesters, and Calvin Klein commercials, freak out and call their congressperson.

Of course, the congressperson doesn't actually know whether or not there's a flood of kiddie porn online. He (or she) has never been online and isn't about to go there. But he does know that his constituents have seized on An Issue that they are truly passionate about. Under such circumstances, it takes a brave man to do nothing. So he gets together with his colleagues and passes a law that effectively addresses a problem almost no one has ever actually experienced, while issuing forth a whole new set of real ones.

This is democracy in the Television Age, working with hideous efficiency. It is, as I say, Government by Hallucinating Mob. A push-me, pull-you that is self-contained and almost completely detached from anything I would call “real.” The US government has broken, the victim of television and of connection crash in general.

**S**o, this is an election year. What's a voter to do? By the time you read these words, San Diego and Chicago will be aswarm with sweating party regulars, blowing plastic horns and driven by the mysterious belief that their efforts will Make a Difference. Might they? **197▶**

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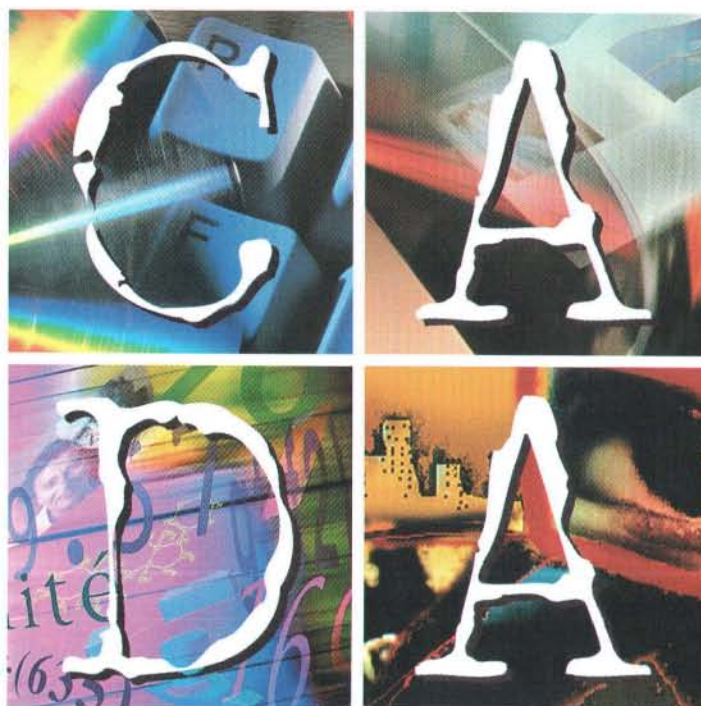
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◀ 195 Personally, I rather doubt it, at least from the perspective of a netizen.

Let's just take a look at the Big Prize here, the presidency. Who would better serve the Net, Dole or Clinton?

Apart from the fact that Dole is of a generation to whom the telephone is suspiciously newfangled, he has, to the best of my knowledge, only once given evidence that he even

knows the Net exists, and that only recently when he agreed to co-sponsor a bill that would relax the crypto export embargo. I'm not flatly stating that he doesn't know anything about it, but it's important to remember that he comes from the heart of the United States Congress, a powerful reality-distortion field that has left the overwhelming majority of its inhabitants not only clueless about the Net but *dynamically anticlueful*.

There is in Congress a profound cultural resistance to digital awareness. I've spent a lot of time on the Hill over the last five years, and I can count on two hands the number of congresspersons and senators who understand the Net – a much lower percentage than the populace in general.

I have a friend in Washington, Kimberly Jenkins, who for two years has been operating an admirable project called Highway

1. The main purpose of this nonprofit, well-funded (by companies like Apple, AT&T, and IBM) and slickly professional outfit is to show cyberspace to Congress. Easy opportunities are afforded for congresspersons to get a Web demo and learn about all that tricky stuff like email. Is it working? Not yet. "They send their staffers, but they can always find a reason not to come themselves, even when it's right down the hall," Jenkins says.

**We behold here the opening phase of a deep conflict between two societies: one still in power, born of television, and the other emerging in the virtual world.**

Why is this? Because Congress represents Televisionland. That's who elected them. I believe that the fundamentally different media environments of television and the Net create world-views that are naturally inimical to each other. Thus, the intransigent not-getting-it-ness of Congress is actually a cultural immune response to something that might eventually overcome the Generican

society they were elected to serve. They don't want to get any of it on them. And you can't blame 'em.

Now Clinton. He and especially Al "Information Superhighway" Gore ought to be the candidates to support. They've got some great people working on these issues for them, people like Mike Nelson and Tom Kalil, who clearly do get it. But it doesn't seem to matter. The system is

bigger than the people who purportedly run it.

Despite knowing better, the Clinton administration has spent the last three and half years talking about how important the Net is while trying hard to kill it with truly terrible policies regarding cryptography, pornography, and copyright.

In private conversation, White House staffers will tell you their hands are tied. Regarding crypto, one of them once told me he agreed that the embargo should go, but, "It's like this, John Perry – we're more afraid of the NSA than we are of you." That's a chilling thought up front, but I think it goes deeper than that. Like Senator James Exon, they're really just obeying The Market, even when they know The Market is having a television-induced nightmare.

The strongest argument anyone in the White House ever made to me for crypto controls – the one they actually believe – was this from Mike Nelson: "Imagine the reaction of the American public if a terrorist set off a nuclear device in New York after concealing the plot with encryption we couldn't penetrate." In other words, the policy driver here is not the serious damage that insecure data systems are already causing our economy, but the Nuclear Terrorist, a creature that is more media virus than demonstrated threat.

The administration's willingness to pander to Generican delusions, even against its own better judgment, also resulted in the president's continued support for the Communications Decency Act, 199▶

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OJ's Conscience

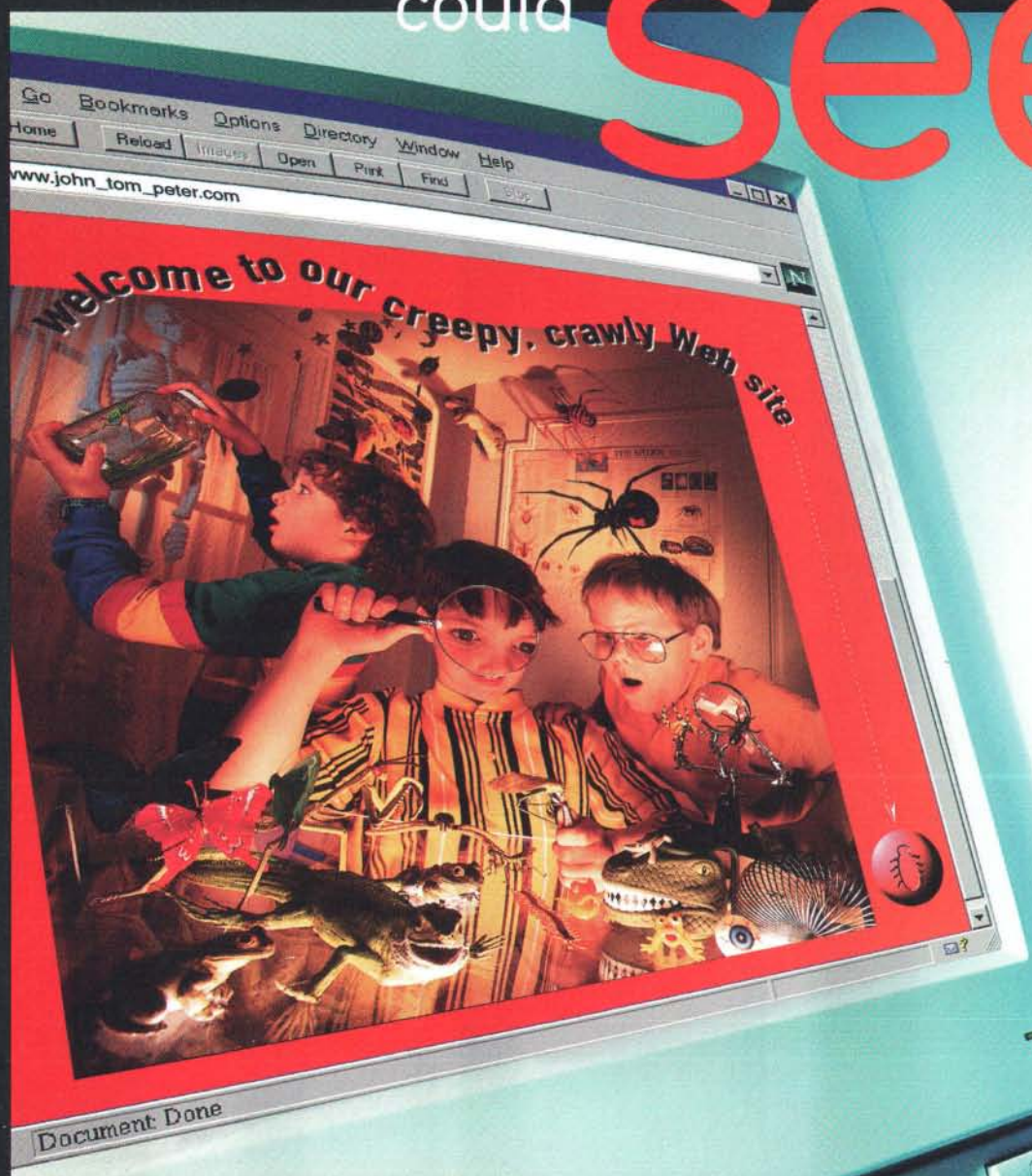
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## THE NETIZEN

◀ 197 even after it was struck down by a three-judge panel in Philadelphia in early June.

Now, I grant that they were backed into a corner. As Mike Nelson said to me in their defense, "Unfortunately, we were not able to get the bill fixed, and now we are having to defend the provisions in court. That's the way the system works - Congress writes the laws and we implement them." True enough, but there are cooler levels of support that could be manifested than Clinton's public statement following the decision: "I remain convinced, as I was when I signed the bill, that our Constitution allows us to help parents by enforcing this Act to prevent children from being exposed to objectionable material transmitted through computer networks..." Unlike the judges, the president didn't bother to look too closely at how the Act actually mocks the Constitution. His people are still in the same cowardly mode that prevented them from engaging in a full-court press to stop the CDA at the many earlier points they might have done so. Since they don't want anyone from The Market to start talking about how they're soft on kiddie porn, they'd sack the future of liberty to prevent it.

There you have it. From the netizen's point of view, it comes down to a choice of enemies. In Dole, we have someone who probably doesn't understand us at all and wouldn't like us much if he did. In Clin-

ton, we have someone who understands us in some dimensions but is too cowardly to turn that understanding into a hard policy commitment.

I feel funny about blaming them for this. They are, after all, serving the wishes of the electorate. In a democratic society, it's dangerous for elected officials to ignore the body politic. But what if it has been driven mad by television? What if the duties of citizenry have been abandoned by most of those who are still sane? Thomas Jefferson never imagined the conduct of democracy in the thrall of a mass medium.

We behold here the opening phase of a deep conflict between two societies. One, still in power, was born not only of television but of the entire Industrial Era. The second, far more heterogeneous in every dimension, is emerging into all the tiny possibility spaces of the virtual world.

As a percentage of the whole, the great white Party of the Past has been declining since its golden era under Reagan. It is now a shrinking minority, and its increasingly aggressive impositions - whether the War on Some Drugs or the gathering War on the Net, of which the CDA was only the beginning - are evidence that it knows its own morbidity and is trying to erect a fortress of control while it still has an army to do so with. That which can no longer be held by popular consensus must soon be held by force.

But that the society in decline no longer has the numbers doesn't mean that it no longer has the votes. We of the society on

the rise don't vote like they do. Even if we did, we are such a fractious lot that we would be like all the splinter parties of Italy trying to form a coalition against the Fascists. Organizing the Party of the Future is the ultimate exercise in cat-herding.

The bottom line: We still have to bide our time. By the time we could elect enough of our own to make a difference, the Net will have so completely altered the structure of everything around it that the US Senate will seem about as relevant as the House of Lords.

This doesn't mean we should turn our backs on it. I do think we should vote, and, while I wouldn't make this a sole criterion, I will be looking for Net-savvy candidates to vote for. (Since I don't expect to find very many in my neighborhood, I'm donating money to distant others that I can't vote for.) Over the long run I'm deliriously confident, but I certainly don't have my short-term hopes up.

I think the best we can do for the next few years is to focus on that pillar of American government that is not so democratically responsive, the judiciary. While it's open to enormous influence from the presidency through the system of judicial appointments, it nevertheless remains our best hope. Look at what happened in Philadelphia. The reason the judges were able to come out with their recent CDA verdict upholding the rights and freedoms of the Internet was that none of them is running for office. It wasn't their job to serve The People. It was only their job to serve the truth. ■ ■ ■

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# Billups

◀ 141 you see today are still dealing with 1940s form and structure. But it's changing big time now. There's a new Hollywood that's going to be around a lot longer than the old Hollywood, and that's the one I want to be a part of."

"He could easily have a huge job at any studio – overseeing a digital department, for example," says *Precious* director Philippe Mora (*Communion*), "but he's very independent-minded." Billups, now 47, officially bailed out of the mainstream in

saw the thing, I realized it was obviously the future. I saw it and fell in love with it," he sighs. Billups and a friend, Chuck Mellone, began hacking the Mac, eventually rigging it so they could pull out a video signal. Taking part in an early Macworld seminar, Billups remembers being publicly blasted by Apple honcho Jean-Louis Gassée, who objected to the machine's being tricked up as a video graphics device. "They threw me off the developer's team, and I was one of their veterans," Billups recalls. "They felt this was inappropriate use."

A talent for inappropriate use has become a career of effects-heavy filmmaking. Billups intersperses his celluloid pursuits with consulting gigs for corporations such as Hughes, Mattel, and Kodak, and guest appearances at events

struct of Marilyn Monroe (see "The New Hollywood: Silicon Stars," *Wired* 3.12, page 142). Digitally rebirthing the platinum screen goddess in his SGI incubator is perhaps Billups's best-known accomplishment. At the same time, it probably cemented his reputation for eccentricity. Still, even the most skeptical among the ruling class are grudgingly beginning to agree that he and the growing digital cohort are onto something when they refer to the computer as a "modern camera" – and one that doesn't necessarily spell megadollars.

"Computers started out as something for the moviemaking elite, but they're evolving into something liberating for everyone," he says, settling into one of five cubicles in the labyrinth of computer-stocked offices that serve as his workspace. The gray carpeting extends up the walls, muting the ubiquitous electronic hum of the workstations. "It used to be that if you saw something in your mind's eye, you had to get a whole bunch of people to believe in it, somebody to organize it, somebody to

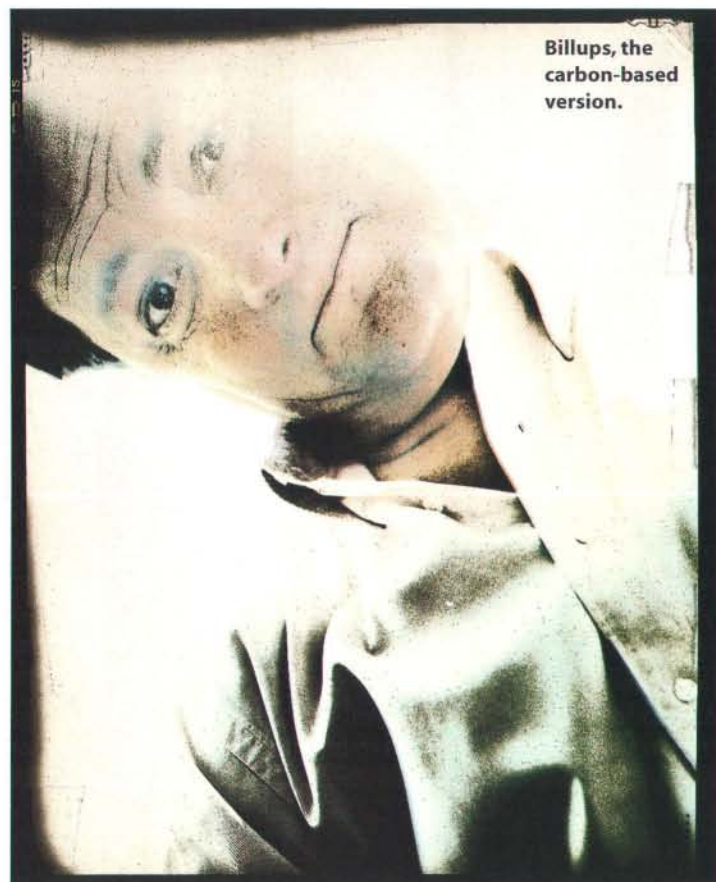
**Smart agents will be so true to life, Billups says, that "some of your best friends will be virtual."**

like the Virtual Reality Conference in Amsterdam and the World Telephony Conference in Rome. The interactive illuminati know him well.

But some of Billups's most inappropriate

direct it, somebody to shoot it. Now, whatever you see, if you know the right couple of people, you can make it.

"It's getting back to the single person, the author, who has an idea and can go with it without having to run the gauntlet of a tableful of studio lawyers." The independents – inclined to take chances because of time and budget constraints – are Billups's natural allies. He and Mora had great luck pitching *Precious Find* to Republic Pictures, a dynastic B-movie studio (John Wayne made his string of Westerns there) purchased recently by Viacom, which has allowed the studio to maintain its autonomy, operating comfortably out of the mainstream. "Two years ago you would have needed a whole facility to do a film like this," says Republic production VP Randy Torno. "The fact that a guy like Scott can sit in his basement and create these new worlds is amazing, and it's going to create a lot of opportunities for independent studios as well as for indepen-



Billups, the carbon-based version.

1983, after spending seven years running his own ad agency, which produced commercials for everything from Giorgio perfume to Brim decaffeinated coffee; he sold the company, Creative Concepts and Designs, to its 80 employees for \$1. Ask him what he does for a living now and his formal response is: "retired."

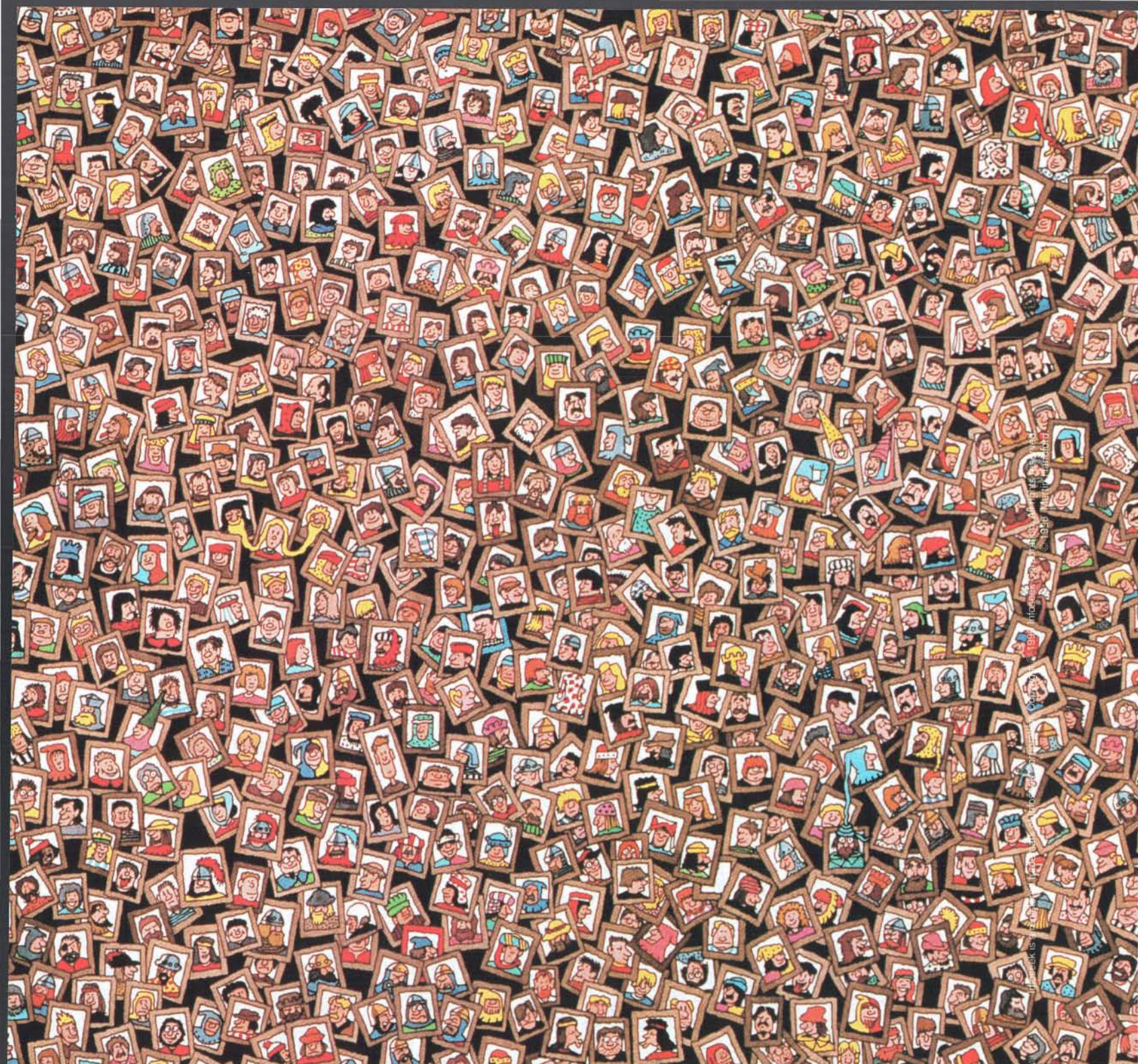
The last account he worked on was Apple. "They were just getting ready to come out with the Macintosh, and when I

notions have lately caught the attention of the industry at large. Crunch the accumulated data on the movie business through his mental mainframe, and you get a vision of a New Hollywood that includes silicon-powered actors, elaborate sets built and "photographed" in a computer, and animated smart agents who, as he puts it, "are going to have such believable personas that some of your best friends will be virtual."

His already are. Billups, along with his digital associate, Mark Lambert, spent the better part of last year locked in an electronic embrace with a computerized con-

Paula Parisi (pparisi@aol.com) covers technology for The Hollywood Reporter. She interviewed James Cameron in *Wired* 4.04.





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# Billups

◀ 200 dent filmmakers."

The possibilities – and the novelty of the basement atelier – weren't lost on 20th Century Fox, either. Billups and a screenwriter-director friend named Adam Rifkin sold an atomic insect thriller, *Big Bugs*, to the studio in 1995, on the strength of a treatment and a two-minute effects tape they put together in a weekend. Its anticipated release date is summer 1997.

"This was a guy who in his basement produced images that were competitive with the major effects houses," marvels Fox Family Films president Chris Meledandri. "He created effects that were extremely believable. The tests he shot for *Bugs* – that was literally the street he lives on."

Then came the ironic, but predictable, twist: after having been wowed by Billups's homegrown ingenuity, Fox reverted to form and is going with more established companies for the f/x services on *Bugs*. Meledandri cites "a combination of the volume of work and the schedule on which it needs to be completed" as reasons for taking the road more traveled. "There is still a tendency among studios to work with companies that have track records," is how he diplomatically puts it. "New companies are breaking in every year, and they have to work hard to gain the confidence of the studios."

Rifkin says simply, "We wanted to do this maverick-style, and they wanted to go red-carpet-style. When the studios see money being made on low-budget effects films, they might kick in, but they're not going to be the ones out there taking chances."

Hollywood's preference for cozy collaborations is ancient history. But Billups also faces emerging, cyberliterate skeptics. At the Artists Rights Digital Technology Symposium last spring, he unveiled plans to cast computer-generated leads in the upcoming, comic-book-based *Eye of the Storm*, and the audience bristled at his concept of "automatic entertainment."

He sounds a little bored when reciting his reasons for championing synthetic talent. "I love actors, but they can be very undependable." A recent gig as computer graphics and visual and digital effects gun on the film *Barb Wire* was "a pain in the ass, because sometimes we just didn't have all

our characters there when we were ready to start work. And when we were out in the desert shooting *Precious Find*, Rutger Hauer backed into a cactus and was in the hospital for two weeks." His scenes were shot as though he was there, the intention being that Billups would digitally insert shots of the actor performing his role against a blue screen.

Would it have been any easier if he had had a virtual Rutger Hauer? Billups smiles. "I have maybe a little virtual Rutger. I wouldn't try to pass it in a close-up, and I wouldn't want it in any major scenes, because it doesn't measure up to the talent of a guy with a major acting history behind him. But in the right context...."

Anyway, he insists, he's never suggested that silicon should replace live actors. "Let's look at what synthetics can do and can't do. Aside from their characters and the roles they play, an actor's real commodity is his or her private life. Pick up any magazine. Which did you see more analysis of, Kevin Costner's performance in *Water-*

Imagine your average secrecy-obsessed studio executive's response to the following: have the entire production of *Eye of the Storm* (which Billups hopes to direct) unfold on the Net, with a homepage that receives live electronic feeds from cameras placed around his set, including those used for principal photography.

"You want to see how a movie is made? A real movie? From the casting call all the way through to final edit? If you've got enough endurance, you'll be able to sit there with everybody else who's got to sit there – and see how it's done. I think it's a great idea to open a movie up to the marketplace and let the marketplace participate, rather than just putting up a Web site that's some post-event hype factory. This way, you're there at the casting call: do you like this person or that person? Throw a vote in! Maybe, if you're convincing enough, the webmeister will go over and whisper in somebody's ear."

But what about protecting your project. What if people do stuff with your images?

## Billups and a friend sold *Big Bugs* to Fox on the strength of a treatment and a two-minute effects tape they made in a weekend.

world, or all the crap associated with his private life – the dealmaking and his divorce?"

At the ARDT conference, Billups recalls, Screen Actors Guild president Richard Masur reflected the general unease about synthetics when he asked, "What about feeling?"

No problem – Billups believes it will soon be possible to communicate feeling through a keyboard or a mouse. In fact, he would like to digitally replicate James Dean and "reconstruct" the actor's final film, *Giant*, according to its original shooting script; the film had to be revised drastically because Dean died two weeks before production was completed. (Billups speaks more guardedly about this idea now that a swarm of litigious estate lawyers and Directors Guild of America Inc. members has descended in preservationist ire.)

Then there are his ideas for how Hollywood can ratchet up the entertainment and information quotient on the Web.

"Let 'em!" he says gleefully. "This whole proprietary thing is way out of control. This is an entertainment property! We're going to tell a really cool story, using the best technology and hopefully the best people, and it's supposed to be fun."

**P**recious Find, which Billups describes (in classic Hollywood-speak) as *Treasure of the Sierra Madre* set in space, stars Rutger Hauer, Brion James, and Joan Chen in a greed-begets-grief tale of interplanetary garbage haulers who stumble on a gold mine. Billups will create roughly 12 minutes of digital effects, including 200 "virtual," most of whom will function as extras, and 14 virtual sets. The most elaborate of these is Moonbase Alpha, a multi-level lunar central, the nexus of colonial activity, and a base where rockets launch and land.

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# Billups

◀ 202 years? "It makes a real convenient garbage dump," he says, explaining that the model for his habitat was a waste-processing plant in Carson, California, where the location work and interiors were shot. He re-created the gurneylike locale in his computer for establishing shots in which a wide view of the space center humming with interplanetary craft would replace an overview of industrial California and the deteriorating sludge factory.

The big-budget alternative would have been to recreate the building using what Billups routinely refers to as carbon-based (as opposed to silicentric) elements on a studio back lot, at a cost he estimates would be in excess of \$1 million.

Billups's version required a few off-the-shelf programs and some inspired people-hours. "We started with Form•Z, a very powerful modeling package for the Mac. Onto those geometries we mapped photographic texture elements from the loca-

photography, but mans the motion-picture camera to shoot inserts and effects plates, a filmmaking style that, needless to say, would never go over on a studio set, where those who venture beyond their prescribed task face union wrath. Billups, a camera-person by training – he served as an assistant to noted cinematographer James Wong Howe – has assembled what he calls "a vast back lot" of plate elements, versatile shots that can be used as backgrounds for any type of action or effect. Billups says his habit of taking the tail ends of film rolls to shoot elements – putting spare plates in the bank – is a tip of the hat to George Lucas. "He came up with that on his *The Young Indiana Jones Chronicles* TV project – he was shooting plates on one location that he'd bank for a completely different episode later on. He'd be, like, 'OK, get those actors out of the way! Shoot that plate!' Boom!"

Compositing, whereby multiple elements are sandwiched together, was accomplished on *Precious Find* using Adobe's After Effects;

face on a little polygon inside the helmet, so when you look at them closely you'll see someone in there talking."

For now, Billups is fretting over the fine points, filling in details that will transform the digital painting into a buzzing hub of intergalactic activity. He'll add lighting, reflections, and transparencies using Electric Image, which provides up to 1,000 types of lighting of different frequencies, shapes, and colors. In Billups's assessment, the package also offers the best depth cueing and motion blur on any platform. "These are things that make computer geeks woozy," he notes. "For years we were saying, 'Guys, you look out on the horizon and things get grayer and less crisp as they get farther away.' But those were the type of naturally occurring event structures that never got written into computer programs. They'd say, 'Why do you want to reduce the resolution? Why do you want to blur it?'"

Thompson Digital Inc. was the first company to make such breakthroughs, "but then it got bought by Wavefront and they screwed it all up," Billups complains. The old TDI prime lens equivalents – applets that allow you to match the aspect ratio of images on your computer screen to that which you'd see through a variety of movie camera lenses – are, however, still the best around. Shunning the "homogenized" release currently available through Wavefront, Billups hacked the classic to come up with his own modern version that interfaces smoothly with his newer programs.

There are even programs that allow you to fuzz up the digital image with grain, a visual cue that viewers of a certain age associate with film – he's quick to acknowledge it's an "old predisposition."

"We grew up with grain in movies, and subliminally, when we see grain artifacts it tells us that this is a quality story. But we don't count anymore. We're getting old and infirm. The generations coming up were raised on video and computer games. They want high chrominance, which is not a film attribute. There are colors you can get in the electronic realm that you just can't get on film."

Now that virtual sets are "pretty much accepted across the board," Billups sees virtual actors, creatures much more

## Billups got his NASA footage for *Precious Find* by having an assistant trail the crew of *Apollo 13*. "Why be redundant about it?"

tion." The texture mapping was done with Photoshop running on the Silicon Graphics Power II Extreme. "It really screams. It's kinda worth having an SGI around just to do that," he says, grinning. (Though seductive, SGIs tend to be an unnecessary luxury: "Pound for pound, dollar for dollar, the new 150-MHz Mac PCs render at least two times faster than comparable SGIs, plus the software's a lot friendlier, and there's a broader base of people you can work with. If you're ILM or Digital Domain, it makes sense to have a bunch of SGIs, Challenge servers, and the whole nine yards. A little guy like me, I'm shooting film, directing my action, creating my virtual environments, building the models and animating them, and printing back to film. I need a platform that's versatile.")

The photo textures are "how we get a high degree of believability on this stuff." A living study in the type of human multitasking required for fast and loose effects work, Billups not only does his own still

rendering, in which the computer crunches the data and spits out the finished shot, was done on the Mac with Electric Image.

For long shots, the moonbase will eventually be composited into a background photo of the lunar landscape, albeit dirtied up a bit. Billups's version looks like the space brigade spent some time four-wheeling around, an effect achieved with a few mouse strokes applied to NASA footage. "We basically hired a production assistant to follow Ron Howard's people around while they were working on *Apollo 13*," he says. "Why be redundant about it? They accessed a lot of reference material from NASA, and it's all free, all public domain stuff."

The finishing touches on his moonbase scene include set dressing – piles of barrels, "little cars zipping around." Lastly, he'll add the virtual actors, "200 to 300 little space-suited guys we'll create on the Mac using Electric Image Kinemation. All we're doing is playing a movie of a real person's



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# Billups

◀ 204 sophisticated than his suited-up extras, as the next big thing. He's already created roughly a half-dozen synthetics, including some Dungeons and Dragons oddities for a TV pilot, and numerous celebrity body parts. "I do a lot of expression work." For the Rival comic-book spin-off *Eye of the Storm*, he has built a digital leading lady, Synthia, and a pack of "war dogs."

But it's the Marilyn character Billups is working on as part of an ongoing project for GTE Interactive that has put him on the cutting edge of the effort to make a "smart" synthetic star, one that responds independently to stimuli and has its own digital consciousness. "The physical properties of Marilyn are nice. It's a nice thing. She has a logic algorithm to her that is very similar, I feel, to the organic algorithm of the real Marilyn." Billups began his reanimation about a year ago, starting with the scans of three live Monroe impersonators. This latest generation of his cyberstar has, he says, evolved considerably beyond its predecessor. "The old Marilyn was polygon-based, the newer version is spline-based, which means you're working with curves instead of angles. It's very lifelike."

Billups is also jazzed about experiments in prosodically appropriate speech, something he feels will have enormous impact, not only on Marilyn, but on all future synthespians. The tests, by Catherine Pelachaud and Scott Prevost at the University of Pennsylvania, were designed to construct 3-D virtual agents that can execute simple commands online. Their system enables synthetics to associate appropriate speech and corresponding facial and body expressions with the task they've been assigned. Billups eagerly pops in a videocassette showcasing the academics' latest achievement, *Gilbert Goes to the Bank*, wherein a crudely rendered human character successfully transacts a prescribed action – in this case cashing a \$50 check. The exchange is a bit verbose, and almost comedic with its exaggerated nods and gestures, but the mission is accomplished.

"These UP guys definitely have the best personality stuff going," Billups says excitedly. "Their whole approach is that ges-

tures are part of communication, and I think they're really onto something. And these are just college students with no money. Imagine what's going to happen when some good codesmiths sit down and take the kernel of what these kids are working on and develop it with a budget. The implications for motion pictures could be quite interesting."

In the meantime, Billups is putting some time into the effort himself. In addition to Synthia, *Eye of the Storm* will feature Finesse, a character played by a live actor who uses a digital stunt double. "We'll scan the real actress's face and attach it to the double, who will perform action sequences too dangerous or costly for her to perform."

But the real thrill will be that Synthia and the digital double, thanks to software written by Billups and his partner Mark Lambert, "will have the ability to be driven by synthetic protocol, with synthetic muscle groups. You just type a command. There's no puppeting, nothing. They come

**"We have a carbon bias. We need to start thinking silicon-carbon interface, rather than, 'This one is a box, and I'm human.'"**

up with their own scenario." It works like this: scripts will be optically fed into the computer, where the bit-stored actors will "read" them, looking for their dialog, and their dialog only. "Synthia will look on both sides of her dialog block, see who she's talking to and where they're scripted to be, turn to that person, and have the dialog."

As for Marilyn, "her conversational abilities will be prosodically correct," Billups says with a touch of pride. "She'll be very Gilbert-like, in that she sees her goal and she knows how to get there. It's a digital mind-set, and it's hard to architect right now because we have such a carbon bias. We need to start thinking silicon-carbon interface, rather than 'This one is a box, and I'm human.' This carbon bias is really inappropriate, because we are just dual hemispheric chemo-electric processors. We're carbon-based, computers are silicon-based, but it's really not that different. Processors are just now getting to the

point where we've got interfaces designed with real human engineering involved. I think a lot of the syntax and context-correct speech modules are going to be showing up in synthetics."

Billups's big-picture view of human-as-machine was shaped largely during his young adulthood in upstate New York, where he bounced around the SUNY system for seven years, "majoring in staying out of Vietnam" and studying psychophysiology, the study of operant conditions, or "how the physiology of human functioning manifests itself in characterizations and interpersonal relationships." At SUNY, and later doing research at UC Berkeley, he was fascinated by such questions as, "If you can monitor human functions, can you control them? And if you can control them, or restructure them, what effect will that have?"

"Man is just a machine in search of a socket," he says, laughing. "And I think when the first person jacks in, it's going to make crack look like Midol." The biggest

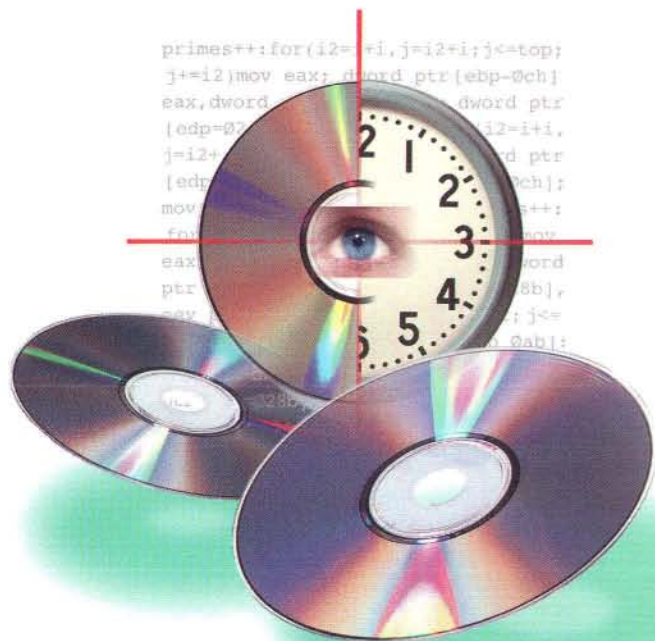
obstacle to that eventuality, he points out, is the problem of increasing the clock rate of the human brain so it's on a par with that of computers. "We're basically a potassium-gluconate structure, capable of many times acceleration over our normal, dull, operating system. We have a very sophisticated dual processing system, chemo-electric, piezoelectric environment. And you can clock that up to incredible speeds."

How fast?

"We're operating probably at one one-hundredth what we could be." What would life look like from the accelerated perspective?

"Well, everybody else is going to be looking really slow." He laughs. "You can already start to see it. If you work on a computer a lot, you start to develop some of the physiological attributes that we're going to have to live with in the future, and that's like mechano-morphism. Big-time problems! – the inability to tolerate human foibles." ■ ■ ■





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## Winblad

◀ 145 \$500 from her brother and started Open Systems Inc., which built accounting software for microcomputers. Three colleagues from the bank took yearlong sabbaticals to join her and opened offices in Minneapolis, above the studio of the musician formerly known as Prince. "I was the oldest in a large family. My parents always say trust your judgment," she recalls. "This was the riskiest thing I have ever done in my life, but sometimes you just have to take a risk."

She was such a novice at selling their Open

lisher Will Hearst's house, Ann met Heidi Roizen. Winblad was there with Bill Gates, whom she had been dating since they met at Esther Dyson's PC Forum conference in February 1984. Bill introduced Ann to Heidi. Microsoft was about to go public, so Heidi asked what would have been a logical question in, say, 1927: Did Ann intend to tag along on the IPO road show with Bill and go shopping? It's not unusual for good friendships to start with such faux pas, but Roizen, who went on to head T/Maker (a Hummer Winblad company) and is now vice president of developer relations at

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Systems Accounting Software package that she began her first sales presentation by flatly reciting the software's finer points. The chair of the company she was pitching to pulled her aside. "If you're gonna run with the big dogs, you're gonna have to lift your leg," he said. She switched gears and became more aggressive. "I went for the close and asked for the money." Result: she flew home with \$150,000 in checks in her purse. It may have been the only time anyone has had to urge her to be assertive.

### The odd couple

Winblad and her partners sold the company for \$15 million in 1983. She did what any other new computer millionaire would do: move to San Francisco "to figure out what I was going to do next."

Shortly after relocating, she appeared in an article in the *San Francisco Examiner* on the new California entrepreneurs. "All these venture capitalists called me up - 'We've got this software company' - they sounded like a bunch of sick puppies," she says. "But one venture capitalist, Steve Halprin, he's sort of an older, really nice guy from Ossco Ventures, called. He says, 'I don't think you should be turning all these VCs down. It's not like Minnesota. They really are part of how things work out here and you want them to be your friend.' He was the only guy who explained it to me."

At a Valentine's Day party in 1986, at pub-

Apple Computer, had a few more drinks and apologized to Ann for assuming she was "fluff material."

Today, they are the Lucy and Ethel of high tech. There was the time the two of them spent Valentine's Day at Santa Ynez Ranch near Santa Barbara. Heidi was pregnant and her husband was out of town, so she and Ann made reservations for the weekend. They requested two beds, but when they arrived, the room had a double bed and a bottle of champagne. Recalls Roizen: "Ann marched back to the office and said, 'She's my friend, not my lover. It's not my child!'"

We make our way onto a dark Mexican freeway and head for the lights of downtown Tijuana, 10 miles away. OK, so we're doing the spring-break circuit in Tijuana, driving around in some wimpy American rental car looking for action - or at least a place to park. Suddenly I view the revolving lights of a Tijuana police car in my rearview mirror. We think about life inside a Mexican prison. "What are you looking for?" asks the officer, using the opportunity to take a peek inside our car. "We're looking for the street with all the *farmacias*," answers Ann innocently. Bingo. Instead of searching our car for drugs - or planting them on us - the officer smiles, jumps in his car, switches on the lights, and gives us a full-fledged escort.

In San Francisco, Ann did consulting for Price Waterhouse, Apple, Microsoft, 210 ►



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# Winblad

◀ 208 and others and even found time to write a book on object-oriented programming for Addison-Wesley. During a mission for a venture capital firm, while checking out some ill-functioning software designed for hotel automation, she met Hummer. Ann recognized a smart guy when saw one. Hummer, who has degrees from Princeton and Stanford, began pestering her to start a VC fund that focused on software. "He literally would call me up once a month and say, 'I want to do a fund that just does software and I want you to be my partner,'" she says. She finally relented.

When Ann and John set up their fund, they found themselves competing with 144 other venture operations trying to raise capital from pension funds and other institutional investors. To distinguish themselves, they rented office space in Emeryville, California, a basketball-court of a community just across the bay to the east of San Francisco. It put Hummer Winblad in the nexus of UC Berkeley-inspired start-ups and light years away from the Sand Hill Road venture capital ghetto in Menlo Park, near Stanford.

There were two distinguishing features of the setup: the oddity of investing only in software companies and the juxtaposition of the partners. Picture the tiny Winblad, who looks as if she just left cheerleading practice, alongside former NBA starter

## Digging in the dirt

Ann is posing outside The Caves, a jamming bar on Tijuana's notorious, club-lined Avenida Revolución. Disco music is blaring from within. Photographer Eric O'Connell adjusts his light filters as he mouths the lyrics of the song pulsing deep within The Caves: *Don't want no short-dick man. Don't want no short-dick man....*

Somebody asks if we're from *Playboy*. Occasionally, a beefy Mexican guy stops to put his arm around Ann. She doesn't flinch but instead grins. It's as if we're all in high school, doing gag photos for the yearbook.

The relentless pace of our visit doesn't slow her. But she also works as hard as she parties. "If you don't work 12 hours a day, you're behind," she says. "If you don't read 100 trade magazines, don't check your email, don't return somebody's call, or don't go to a developer event, you're behind. Either you're committed or you're not."

We cruise the noisy street, a playground of neon, skin, and testosterone. Ann wants to pretend we're searching for our lost children. Which, in a sense, she does for a living. Many venture capitalists prefer a hands-off approach to operations and hiring; the Hummer Winblad team get their fingers dirty. They enjoy digging around when it comes to finding talent and devising strategy. "They are instrumental in recruiting high-quality people," says Michael Schuh, CEO of Intrinsa Corp., which produces a

dogs have their head in the dish?" they ask, meaning "Are the customers buying?"

Consider the case of Jim Dorrian and Bob Earle, co-founders of Arbor Software Corp. "We put them in a car and drove them around and said, 'OK, give us the puppet show in front of the CIO of Sun Microsystems.' And then we say to the CIO, 'If this company built this thing would you buy it?'" In 1991, Hummer Winblad funded the pair to produce Essbase, a data integration and financial analysis program. Today, Arbor is a public company with a market capitalization of close to \$700 million.

Hummer Winblad's track record is impressive. Out of 33 software companies funded, only one has failed: Slate, a pioneer in pen-based computing. "We violated our first rule: choose large-market real estate," she says. Unfortunately, the pen computing market never got off the ground. Slate sank, despite boasting a roster of industry luminaries, including Dan Bricklin, creator of the Lotus 1-2-3 spreadsheet. Slate was eventually acquired by Compaq Computer Corp. Hummer Winblad lost almost \$1.2 million in the deal.

It wasn't the only time the Hummer Winblad crystal ball was on the fritz. The fund passed up on investing in NetManage, a Cupertino, California-based producer of intranet software products. "We were skeptical that one company could be built around TCP/IP," Winblad says. "Also, Sun and Microsoft had their own initiative."

They were wrong. Last year, NetManage pulled in \$125.4 million in revenue. "In the venture capital business you sometimes have to go on a gut level," says Zvi Alon, NetManage's founder and CEO. "The problem was that she stuck too much to the analysis instead of the gut feel."

Back on Avenida Revolución, Ann strikes up a conversation with a 27-year-old college student from San Diego State University who is waiting in line for a club named The Vibe. In a way, she is seeing what dish this dog eats from. She asks him what kind of computer he uses and about his computer-using habits. "So you're a venture capitalist," he says. "Wow. Cool." She walks away astonished at what she learned from a random guy on the street. "Unbelievable. The guy's got two URLs. He's got his own line of clothes he sells on the Internet." She observes that kids like these will need fat bandwidth. "When young people 212 ▶

**"If you don't work 12 hours a day,  
you're behind. Either you're committed  
or you're not."**

Hummer, who is 6 foot 10. "We looked like a circus act," she recalls.

Her parents had a mixed reaction to Ann's move into venture capital. "My mother asked, 'Are you like Michael Mill-i-ken? Can you go to prison for that?'" But her father was instantly delighted. "He finally felt that I did something valuable when I hooked up with John Hummer, a first-round draft pick who played in the NBA for six years." Her father, who earned six college letters in three years, "polished up his medals" and put them out on display the first time she brought Hummer home to meet her parents.

package that streamlines software development. "At meetings she's bright, energetic, capable, insightful. The résumés follow."

Since 1989, Winblad and Hummer have auditioned more than 3,000 companies. Once a quarter, they hold an open event — dubbed The Gong Show. "People come in for half an hour to talk to us about anything," Winblad says. "Once we had a guy say he could control networks with brain waves. I asked for a demo. He said it was too cloudy."

Hummer Winblad likes to gauge potential customer response to a proposed product as a way of predicting its viability. "Do the



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## Winblad

◀ 210 surf the Internet they want a kaleidoscope experience. Multisensory. They'll want things coming at them, flashing things, while they're doing their homework."

In the few years that Winblad has been a key player in the venture capital market, the software industry has changed from an enclave of smart nerds to the backbone of the US economy. The rise of both the Internet and fully distributed computing heralds further growth. "Years ago, if you joined a software company, it was considered fringe employment," she says. "But now every major corporation has a software factory at the heart of its competitive advantage. Software is changing the infrastructure of commerce." In other words, the future looks good.

### Gimme a V; gimme a C

The thing that tends to come up when people talk about Ann Winblad is Bill Gates. The two dated for a couple of years and are still good friends, and it isn't quite clear whether or not Ann wants to shake the "Bill's old girlfriend" image. It's something we discuss in the car as we cross the border back into California, where the customs guard wants to know what we're doing with all the photography equipment. I tell Eric that I wouldn't want people to get hung up on the fact that I lived with Michelle Pfeiffer for three months. He says he would *prefer* the reputation. Ann says it's no big deal, one way or the other.

A few miles up the road I catch the freakin' revolving lights of the California Highway Patrol in my rearview mirror and glance down to see that I'm driving at 80 mph. I pull over and an officer approaches the window.

"Did you know you were weaving into the other lanes?" he asks.

"In *addition* to speeding?" I answer. (No shit. That's what I said. Ann and Eric let out audible guffaws.)

He does the sobriety number, which I pass. I explain that I was weaving because I'm conducting an interview while driving.

Back in the car, after the laughter subsides, Ann mentions that her dad was also the driver's ed teacher at her high school. It reminds her of something that happened the last time she was in Baja California, when she went to Cabo San Lucas for a few days with Gates.

"We went for the weekend, and we had not thought about what to do. We got there and it was hard to get a rental car, so when we finally got one it was like this beat-up old Volkswagen, and it was spring break. So we get a hotel. It's a shitty hotel, but that's fine because we're doing this on a whim and it's part of the adventure. I leave Bill outside while I check in. Well, I go outside and I say, 'Where's the car?' He goes, 'I sublet it.' He rented the car to some teenagers for five dollars a day! He gave them the car keys and says, 'We're in room whatever. Just knock on the door and give us the keys back.' Sort of like 'I'm Bill Gates; here's the rental car; here are the keys to our room.' I'm going, 'We're never going to see that car again. These are teenage boys.' He says, 'You're probably right.' So here was Bill out there doing a deal, and the car was rented in my name. We finally got it back at about two in the morning, and it was all in one piece."

That's more than I can say for the three of us. It's getting into the wee hours of the morning in San Diego. We're in Eric's hotel room, sucking beer. Ann is patiently explaining to Eric the fundamentals of venture capital while he uses some colored filters to take pictures of her. Ann talks about how Michael Ondaatje's *The English Patient* is the best book she has read in "at least three years" and how *The Thomas Crown Affair* may be her favorite movie. That and *Roman Holiday*.

I ask Ann to go through the drill she reserves for entrepreneurs who aren't performing up to snuff. She prefaces it by saying that most companies don't die from lack of opportunity, but from self-inflicted wounds. "You make them stand naked in front of a mirror," she says. She goes into her VC rap: "David, these figures. The train is leaving the station and we forgot to attach the cars. That marketing vice president we spoke about. Have you hired that vice president? Have you made the decision...?"

These words might inspire terror in the heart of a start-up CEO who sees his mortgaged lifestyle flash before his eyes. But at 3 a.m. in a hotel room, after a warm spring evening of outright fun and only two minor encounters with the police, it doesn't sound so threatening. It sounds like the head cheerleader imploring, "Hey you guys. You're gonna ruin it for the squad."

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## Denning

◀ 165 in Grand Rapids, Michigan. Family legend has it that she displayed independence early: her mother recorded in her baby book that when things did not go her way, Dorothy would gather up her toys and go elsewhere. She was the second of three daughters, but the one most disposed to work for her father, who had a business in wholesale building materials, with offices in Grand Rapids and nearby Grayling, Michigan. She started working while in grade school and earned enough for her first bicycle. By her own description, she was industrious, stuffing envelopes with marketing fliers and rubber-stamping the return envelopes. As she reached high school age, she took on more responsibility, doing invoicing and inventory.

She had a talent, though not necessarily a love, for math. She knew that she wanted more from her career than to work in Dad's office. Her high school adviser, eval-

she took offense that the protesters singled out the field of computer science as a symbol of evil.

That field, despite her earlier resistance, turned out to be her choice of study. She had come to it serendipitously. During her junior year, her father died, and she stayed on campus that summer to work a secretarial job at the radio astronomy department. When the professor in charge found that she could successfully spin out calculations of Doppler shifts on a Wang desk calculator, he suggested she try programming. The idea that she could concoct a mathematical recipe for two months or so, send it to the computer center, and have it quickly returned with accurate results was amazing. "I got kind of hooked," she says.

Programming looked even better after she was sent out for practice teaching – the unruly sixth graders offered a resistance that she would not experience again until many years later in encounters with

**In the late 1970s, Denning was one of the few to divine that a revolution was under way in the world of computer security.**

uating her proclivities, suggested she might look into computer work and described what that might be like. "I said No way," she recalls, displaying what her husband would later refer to as "an iron will." Instead, she headed off to the University of Michigan, on scholarship, so she could train to become a teacher of high school math.

She arrived at Ann Arbor in 1963 and stayed there through 1969, ultimately earning her master's. It was a liberating time, and certainly a political one. Dorothy, in a small way, participated, working on Eugene McCarthy's antiwar presidential campaign. But she was never sympathetic to the radical politics of the time. She not only was appalled at the idea of bombing school buildings for peace, but repelled by the inconsiderate tactics of the antiwar movement in general. One of her teachers was literally carried out of the classroom by judgmental antiwar types. "I found it totally uncalled for," she says. In particular,

Clipper-hating cypherpunks. After graduating, she did not enter the teaching profession, but went straight to grad school to learn more about computers.

At that time, even more than today, computer science was a field with very few women. Denning claims never to have had a problem working in a field largely dominated by men. "I think it was the training I got working for my father," she says. "There was only one other woman in his company, the secretary – so it was something I grew up with. And math classes are predominantly male, so it was always present. It has never been a problem."

When Dorothy completed her master's, in 1969, she was ready to become a systems programmer. She was also newly married to a fellow student named Bill Davis. They moved to Rochester, New York – Dorothy working at the University of Rochester computing center – but within three years the marriage 216 ►



"A TRIPPY, PROVOCATIVE TOUR THROUGH PERFECTLY ARTIFICIAL WORLDS" - Janet Maslin, *New York Times*

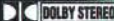
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# Denning

◀ 214 went bust, and she entered a doctoral program at Purdue.

The very first semester, she took a course on operating systems. Her project for that class was on computer security, a subject she liked well enough to pursue seriously. She felt the same way about her teacher, a young associate professor with

all launched from inside the computer centers themselves; in any case, the violations were almost always benign.

The computer-security academic priesthood cogitated about access control, password schemes, and the like. Implementation was left to industry; the idea was that corporate security was perfectly attainable by taking the proper safeguards. Government work was in a realm

face design, where all the mumbo jumbo of the digital infrastructure cuts through to the human mind. At one point, she actually began working on a project called PUNT – “It stood for Program Understanding Tool, something like that,” she recalls – in which the idea was to show on the screen what was happening with the program inside the computer at any given point in time. But her grant proposal was turned down.

In the late 1970s, however, her work in the security realm suddenly got interesting again. Dorothy Denning was one of the few who correctly divined that a sort of revolution was under way in the world of security: cryptography, a field that for most of this century had been methodically controlled by the government, was suddenly out in the open. She had read the groundbreaking 1976 paper by Whitfield Diffie and Martin Hellman that introduced public key cryptography, but felt a true frisson two years later when encountering the article by Rivest, Shamir, and Adleman that proposed a practical implementation of the concept. She was teaching a computer security course at the time, and she realized that no textbook had yet dealt with these developments. As a smart and ambitious academician, she understood that a rare opportunity was available to her: she could write a book on this emerging field.

She had been itching to do a book ever since reading Douglas Hofstadter's Pulitzer-winning *Gödel, Escher, Bach: An Eternal Golden Braid* (see “By Analogy,” *Wired* 3.11, page 110), which thrilled her so much that she invited the author to Purdue, not only to give a talk but to be guest of honor at an elaborate dinner she planned where every course resonated with Hofstadter's tome. (Throughout, the diners munched on “Dilled Eggbread Denning: The Eternal Golden Braid.”) Denning even composed music for the event. “Doug was the inspiration for me to write a book,” she says. “Even though mine was nothing like his,” she adds, laughing.

“She became obsessed with that book,” recalls Peter Denning. “It took her one year, start to finish, in addition to her teaching. She would wake up and jump to her terminal, and then stay up late in the night. When she turned the ▶ 219

## Denning's mind-altering experience at The Forum, a descendant of est, got her to see the box that she lived in.

an MIT doctorate who had just arrived at Purdue after a teaching stint at Princeton. His name was Peter Denning. Within two years, they would marry.

Computer security in the mid-1970s was a rather abstract field, dealing mostly in theories. The embryonic Internet hooked together only a few sites. Although hacker pranks were common, they were almost

of its own. (Denning wrote her thesis on information flow, but only as she was finishing did she learn how a similar problem – the flow of classified information – was handled by the military.)

Dorothy Denning was good at her work, but she kept thinking she might be happier tackling another, more vital, area in computer science – graphics and inter-

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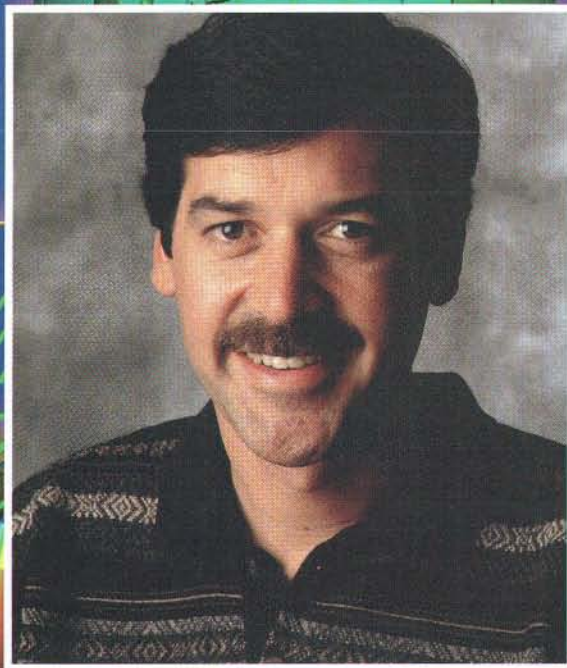
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TECHNOLOGIES



# Denning

◀ 216 manuscript in to her publisher, she got reviews from people like Diffie, who offered frank criticisms. She was feeling discouraged, but she dug in and followed their suggestions."

It paid off: *Cryptography and Data Security*, published in 1982, would be recognized as a standard text in the field, not to mention a wonderful technical introduction to the art of keeping secrets in the computer age. At the time, there was a hot controversy between the National Security Agency and the academic community: the NSA felt that by openly discussing and publishing various technical aspects of cryptography, mathematicians and computer scientists might be providing powerful knowledge to our enemies. To ensure against this, the NSA suggested that authors submit to prepublication review. The academics, Dorothy Denning among them, did not warm to this con-

**"My initial findings suggest that hackers are learners and explorers who want to help rather than cause damage."**

cept. She offered the NSA no opportunity to screen secrets. In any case, she says, "The whole time I was writing the book, I never once thought about the fact that cryptography might be a problem someday. It never occurred to me."

That was then. If she knew then what she knows now about the case against the spread of strong cryptography, as well as the needs of the NSA, she says, "I would have sent it to them."

## Hacker den mother

That is the Dorothy Denning who today is the scourge of wireheads everywhere. But only a few years ago, Denning stood miles away from the government perspective, pleading the case for a certain class of lawbreakers. She was, for a brief time, the champion of hackers (though, she emphasizes, not of their illegal activities).

It happened, of course, in California. In 1983, Peter Denning was offered a job at NASA's Research Institute for Advanced

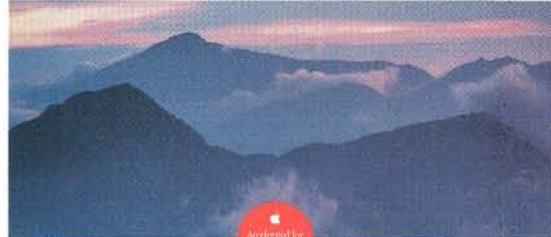
Computer Science, and his wife accompanied him west, taking a job at Stanford Research Institute, the prestigious think tank and research center known for projects like Doug Engelbart's pioneering interface research. Dorothy continued her work on computer security, but was beginning to harbor doubts about some of the implications. One of her main projects was developing a system for intrusion detection, and she began worrying that implementing such a scheme might violate the privacy of users.

Perhaps as a result of this discomfort, she began to yearn for work in what she had always suspected was the more interesting digital frontier: graphics and interface. Finally, in 1987, she got a job in that field at Digital Equipment Corp.'s research center in Palo Alto. To her consternation, she realized she was in over her head. The people there were legendary wizards so steeped in the guts of systems that she found no place in the conversation.

The disappointment was tempered by a fortuitous contact. A young hacker going by the nom de keyboard Frank Drake (in reality the same Steve G. Steinberg now found on the masthead of this magazine) knew of her work in security and crypto and wanted to interview her for a hacker zine.

The ensuing electronic exchange was an absolute revelation to the studiously professional computer scientist. She was impressed that Drake had actually thought about issues like privacy and responsibility, and that piqued her curiosity. Part of her excitement also came from finally dealing with people in her work. "All my time had been spent on these abstract problems, and I guess at that point I was ready to do something different," she says.

That impulse had been fueled by Denning's mind-altering attendance at The Forum, an intense, two-weekend sensitivity workshop designed by Werner Erhard that descended directly from the 221 ►



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# Denning

◀ 219 quasi-religious organization est. The program, she says, was “designed to get you in touch with the beliefs that you had about the world and to see the box that you lived in.”

In her case, the box was the math-driven theoretical world of computer science. She knew that mathematics had a real effect on society, but as far as her inner feelings were concerned, “the connection between mathematics and society seemed remote.” Attending the sessions “woke up the interest I had about society and how my own work influenced society.” Whether it was a case of the workshop affecting her behavior or the grown-up equivalent of packing up her toys and going elsewhere, she decided to explore a more humanistic approach to her work.

So Dorothy Denning delved into the computer underground. She later turned the tables on Drake and interviewed

Her lasting statement was a paper titled “Concerning Hackers Who Break into Computers.” She presented it at the 13th National Computer Security Conference in Washington, DC, in October 1990, chairing a panel with Drake (aka Steinberg), Neidorf, and Emmanuel Goldstein (aka Eric Corley), the punkish publisher of *2600*, a hands-on guide to phone hacking and social engineering. “I thought the people at this conference should hear what these guys had to say,” she says. (There were also some nonhacker types on the panel.)

Though it follows the format of an academic article, her paper actually has more in common with some of the digi-goo-goo writings of Howard Rheingold, John Perry Barlow, and, I must admit, my own book *Hackers*, which is cited as a source. “My initial findings suggest,” she writes, as if squinting into some social test tube, “that hackers are learners and explorers who want to help rather than cause damage and who often have very

**Denning heard about the thwarted rocket attack of an airplane. Without wiretaps, the passengers might have been dust.**

him, then got a list of others to interview. At first it was anthropology. But as she continued, she began to admire their curiosity and accept their contention that they were just bright kids – really – kids who weren’t trying to cause grief. Their misdeeds, she recalls, “didn’t seem all that bad.”

She was smitten, and she admits that part of it could have been a displaced maternal urging. (Denning has no children; “too absorbed in my work,” she says.) “I was at the age when those kids could have been mine,” she says. “I could have been their mother. I started thinking, ‘Gee, if one of these was my kid, he could be going to jail,’ and it didn’t seem justified.” Eventually, she became so involved in that spirit of surrogate motherhood that she took on the role of adviser to the legal team representing Craig Neidorf, a college student facing a prison term for posting a telephone company document in an electronic publication.

high standards of behavior.... Hackers have raised important issues about values and practices in an information society. Based on my findings, I recommend that we work closely with hackers.”

The paper caused quite a stir, and some in the security community regarded it with biting criticism. But the remarks that really stopped Denning in her tracks came from her former SRI colleague Donn Parker, the hawkish computer-crime guru, who considered her stance naïve if not dangerously misguided and, worst of all, unprofessional. He suggested that she might think differently if she had ever considered the other side. Now that she had departed from the mathematics and technical theories of security for the murkier grounds of human psychology, why not seek the other side of the story and talk to those who had to fight off the little bit-snatchers?

So she did, pursuing the project with the same manic vigor with which she 222 ▶



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# Denning

◀ 221 had attacked her book project. It was, yet again, a revelation. One day, she visited the Los Angeles Police Department, where an officer spent hours going through the kinds of cases the LAPD had handled, cases with nasty hackers and real victims. "I saw some of the documents taken off hackers' computers, including worksheets that they used in the cracking process." She saw evidence of outright theft of information, of stolen credit cards with merchandise ordered. "Most of the cases I heard about were ones where there was some monetary action involved," she says. She visited Gail Thackeray, the prosecutor who ran a notorious antihacker investigation called Operation Sun Devil. "There were all these stories about what a witch she was, but she was a very nice person." Then she returned to the San Francisco Bay area to understand the problems the region was suffering with hackers. In each

## If abuse from her stance on Digital Telephony was harsh, Denning received even more brutal treatment for her defense of Clipper.

instance, she felt that the people she met were honest and diligent public servants, protecting the world against what they considered a very real threat.

She came to conclude that the cases with which she had been most familiar – cases like that of Neidorf, in which the government acted improperly against apparently innocent people – had been anomalies. "Overall, the cases were being handled very professionally," she says. "There was also a lot of concern for the kids that they busted. In fact, in the majority of the cases, they met with the kids and the parents and the whole thing was resolved out of court."

After some months of interviewing law enforcement people, Denning came to realize that her own views, as expressed in her hacker paper, were misguided. All that stuff about hackers being thoughtful pioneers of constitutional freedoms was actually, she realized, bullshit. She now has thoroughly recanted her earlier stance.

In 1995, she published a postscript to her 1990 paper which, in effect, contends that she totally misinterpreted the hacker scene. She now realizes that the few hackers she had interviewed may have been "learners and explorers," but the vast majority actually were petty thugs, malicious vandals, or, at the very least, misguided trespassers.

"I no longer recommend working closely with hackers," she wrote, concluding that "working with people who flagrantly violate the law sends the wrong message and rewards the wrong behavior." Instead she suggests "better security and law enforcement ... so that chances of penetration are reduced while those for detection and prosecution are increased."

Dorothy Denning had packed up her toys and moved one more time.

### Spooky beltway insider

In the midst of this reevaluation, in 1991, Denning went east. Going to DEC had been "the worst career decision in my

life," and her anthropological studies of hackers received a poor reception at what, after all, was a research lab. So, when she saw two advertisements in a magazine, one for the computer science department chair at Georgetown and the other for the same position at George Mason University in northern Virginia, she applied for both. Georgetown replied first, and in short order she interviewed and accepted their offer. When George Mason finally contacted her, she told them she was unavailable, but added, "I know just the guy for you." That's how Peter Denning got his job.

It was from that Washington, DC, perch that Dorothy Denning would become a policy player.

In the early 1990s, the controversy du jour in cyber circles was the government's proposed Digital Telephony Bill, legislation that would require the entire telecommunications network to be wiretap-friendly – even if it cost millions or billions

of dollars. *Discover* magazine asked Denning if she'd be interested in writing about it. "It started out as a neutral, balanced article," she says. But she sat down with the FBI and other security agencies and heard the case from their point of view, and became increasingly convinced that wiretaps were crucial to the ability of law enforcement to protect society.

She heard about the planned rocket attack of an airplane being thwarted and learned that without old-fashioned analog wiretaps, that airplane and its passengers might have been dust. Likewise, wiretaps were essential in successfully prosecuting government corruption in a case called Ill Wind. She was particularly impressed that in the fight against organized crime, wiretaps had been the absolutely essential prosecution tool. But all wiretaps were in danger because advanced digital telephone systems would make it harder to install and carry out the taps.

All the government wanted, she was told, was to maintain the same ability it currently enjoyed. And while others suspected that the government really wanted the ability to create more taps, at lower cost, with fewer technological hurdles, Dorothy took her government sources at their word. She had come to know and trust them. The Digital Telephony Bill, she concluded, was a fine and important initiative.

Though *Discover* later changed its mind about wanting the article, in March 1993 she did publish a long story for the *Communications of the ACM* titled, "To Tap or Not to Tap." It was clear that she favored the former. It caused quite a stir, particularly because many knew Dorothy Denning as the computer security specialist who defended hackers. The public defecation was seen as significant, and the reaction commensurate. "After a substantial number of conversations with people in law enforcement, I said, 'OK, I'm going to support this.' And everything changed after that."

The electronic attacks then began, at first on the sci.crypt newsgroup, and then spreading more widely. Many of the postings were ad hominem, and this bothered her. For a while she saved the postings, but eventually the file got too large to keep. The worst responses were from people she knew: they were often 224 ▶





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# Denning

◀ 222 condescending, calling her naïve.

"They thought I had been sucked into the government's side of the debate without really understanding it myself and making my own intelligent decision about it," she says. "That digs at your intelligence and your gullibility, so actually those comments hurt more than the others because they came from people I respected."

Her stance on Digital Telephony had given her a label: the government's good friend. With the Clipper Chip, she would become its best friend.

In April 1993, she got a call from John Markoff of *The New York Times*, who then was researching the story that would break the news of Clipper. He seemed to know more than she did. According to a declassified National Security Council document, she reported the conversation to the FBI, which passed on to the NSC the information that Markoff "knew what

In thinking about the Digital Telephony legislation, she had worried that the whole effort would be wasted if speakers encrypted their phone conversations – in that case, wiretappers would get the taps but wouldn't be able to understand a word. Denning had been musing about approaches to this problem and was delighted that the government was working a step ahead of her. "They had actually worked out something which was better than anything I had thought of," she says, "and it seemed exactly the right thing to do."

At the end of that day of briefings, Denning posted a technical description of the telephone-based Clipper scheme on the Net. She also later wrote a piece for *American Scientist* that attempted to simply explain what Clipper was all about. She meticulously described how the chip's keys were to be stored in government escrow facilities, to be offered only to legal wiretappers. "There were

really looking to make sure that people's data would be well protected with this – not really looking at whether someone could subvert it."

After the panel review, Denning turned from merely describing the chip to outright public advocacy, reflecting the favorable opinion she had held since early in her evaluation. If the abuse from her stance on Digital Telephony was harsh, Dorothy Denning received even more brutal treatment for her defense of Clipper. Typical was the critic who charged that she must have been dropped on her head as an infant. "When she showed me some of the flaming, my blood would boil," says Peter Denning. But she kept on with it, writing an Op-Ed piece for *Newsday*, publishing journal articles, even debating John Perry Barlow on America Online. The Clipper Chick was going full tilt.

Despite the best efforts of Dorothy Denning and the administration, the original Clipper failed. In her estimation, two factors killed it. First, it provided too much to criticize: it had a secret algorithm; it was a hardware chip, not software; and the escrow agencies holding the key were part of the government. Second, there was no market demand for such a telephone system at its US\$1,200 price.

But the essence of the Clipper idea – providing a government backdoor to encrypted files by way of escrowed keys – survived and even expanded to include computer communications and stored computer data. In September 1995, the government came up with a new proposal, dubbed by critics as Clipper II. The administration contended that businesses would welcome this new version because it provided a fail-safe means of retrieving computer data when keys were lost.

There were also concessions: this scheme did not involve a hardware solution, but a software one. The escrow agencies would not necessarily be associated with the government. And if companies used the new key escrow crypto, they could export systems that took advantage of longer keys – the longer the key, the stronger the crypto. Without key escrow, the exported keys must remain only 40 bits long, but with them they could be 64 bits long, increasing security by a mul-

## In effect, Denning is protecting the government with the same maternal fury she once exhibited while aiding hackers.

was brewing." Denning confirms the story, saying that she alerted the FBI of Markoff's call in part to inquire about what might be happening but also to warn them that the *Times* was on the case – a heads up that may well have caused the government to speed up its announcement of Clipper.

Denning didn't really learn the details until two days later, when an FBI friend told her the news. The following day, April 16, 1993, Clint Brooks, the NSA's architect of key escrow policy, drove from Maryland in a driving rain to Denning's office at Georgetown to brief her on the workings of the chip. Brooks remembers her as initially being skeptical, but coming around as she learned more about it. Later that day, she attended a Commerce Department briefing and then met with the FBI. "My reaction was very positive," she says. "It was like they really wanted to let the community know how this thing worked."

all kinds of misperceptions and misconceptions," she says.

Denning was also chosen by the government to be part of a panel of cryptographers who would evaluate the efficacy of the chip, in particular the secret Skipjack algorithm that did the actual encryption. This was very important for the government, because critics seized on the fact that the encryption scheme was designed by the highly secretive NSA, and it was impossible to tell whether the government had stuck in a backdoor that would allow it to break secrets – even without the keys.

The panel concluded that the Clipper Chip was secure. This turned out to be somewhat of an embarrassment, since Matt Blaze, an AT&T computer scientist, discovered in May 1994 a flaw that enabled abusers to use the chip in a way that thwarted wiretappers. Denning counters: "It was definitely not in our mandate even to look for that kind of thing. We were



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# Denning

◀ 224 tiple of many thousands. As the government fashioned this new approach, Dorothy Denning "was very helpful with constructive suggestions," says Clint Brooks of the NSA.

Once again, the marketplace showed no enthusiasm for the proposed changes. So in May 1996, the administration released a draft of a white paper that made further compromises – including provisions for self-escrowing keys. But this third proposal, dubbed by some as Clipper III, was placed in a context of a complicated structure for the management of keys, which, of course, involves government access. Once again, Denning has been defending it. Even though she has not been directly responsible for the twists and turns of policy, she provides the bedrock rationale behind all the schemes, as well as an argument for their necessity.

It seems that with the current climate in Congress – where even Bob Dole has sided with crypto-anarchists in charging

that the administration's policy does little but cripple our own computer industry – that the political tide is beginning to turn away from the administration. The National Research Council's May 1996 report on cryptography concluded that the government's policy is flawed, that key escrow should be approached cautiously, and that current export controls on crypto should be relaxed (see "Clinton's New Clothes," *Wired* 4.08, page 80). It was another blow against the administration – particularly since the committee included such establishment types as a former NSA deputy director and a one-time attorney general.

Yet Dorothy Denning continues, unbowed.

## Destiny

This is a battle Denning may not win, but she thinks it's too important to give up. Recently, she became alarmed by an increase in cases where, she was told, investigative agencies have been frustrated by scrambled files and communications. For several days, she called these

agencies and received firsthand reports. "These cases," she says, "involved child pornography, customs violations, drugs, espionage, embezzlement, murder, obstruction of justice, tax protesters, and terrorism." In the conference she hosted in September, FBI Director Louis Freeh even spoke of a crypto-packing terrorist organization in the Philippines that's plotting to kill the pope.

She thinks that key escrow is destined to be a "third paradigm" of cryptography (after secret key and public key). It could become a standard means of assuring that people can get access to their own materials – as well as, of course, the means by which government can get hold of encrypted information when necessary. Without key escrow, she believes, what some of her opponents lovingly call "crypto anarchy" will indeed rule. "Crypto anarchy can be viewed as the proliferation of cryptography that provides the benefit of confidentiality protection but does nothing about its harms," she explained in a recent paper. "It is like an automobile with no brakes, no seat belts, no 228 ►



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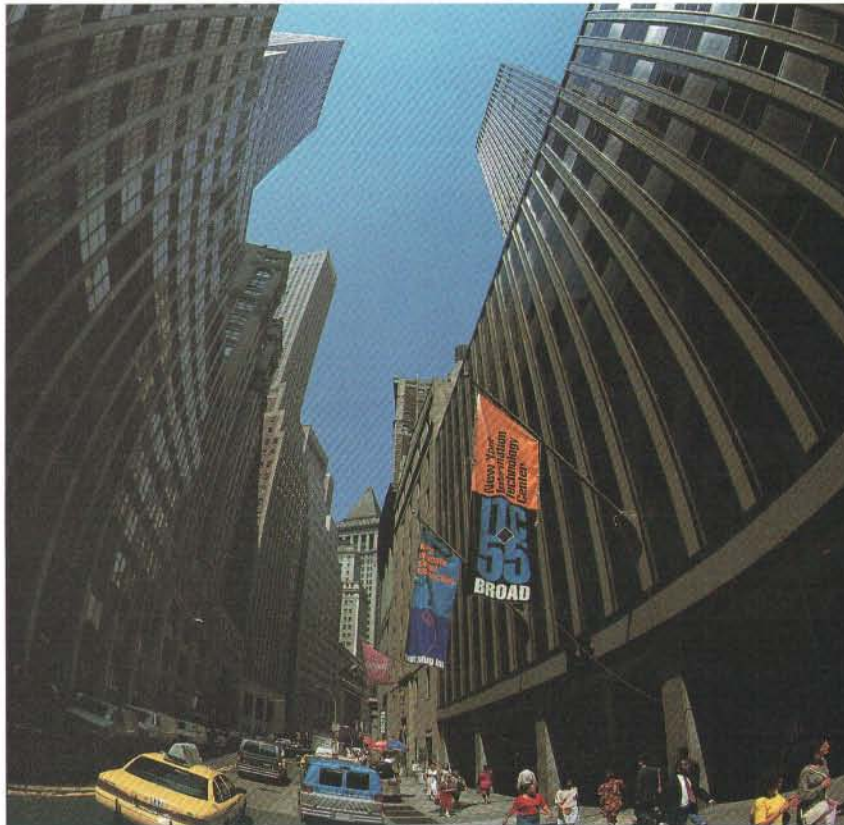
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# Denning

◀ 226 pollution controls, no license plate, and no way of getting in after you've locked your keys in the car." If crypto anarchy were unloosed upon the world, she predicts, "social disorder and lawlessness" would thrive and chaos itself might ultimately rule.

With those stakes, how can she possibly withhold her comments? How can she allow false information about key escrow to remain unchallenged on the Net?

"I have a very strong reaction to things that are false. When I see something that's false, it doesn't matter what it is, I will often respond to it," Denning says. "And so there have been cases where I know I have defended the government because I thought the statements that were being made were not fair. People will say the government is trying to do X, and I say, 'No, based on my conversations with people in the FBI and the NSA, that's not what they're trying to do, they're trying to do Y.'"

So what if her critics maintain that it's

one thing to attempt to correct truths, but quite another to do so in a partisan matter? What if, because her arguments always seem to favor the government, some of her peers in academia and the professional community maintain (off the record) that she has lost her credibility?

"I can see why they would say that, because I find that my own views are very consistent with views of people in the NSA and FBI, and because I will defend them when I think they're being unfairly attacked," she says. "It's true - I do feel inclined to defend the government.

I accept that. I accept I'm not neutral on this issue. I have taken a position on this issue and so when you take a stand, you can't look at it as a neutral impartial observer. That's the role I've fallen into."

"Are you comfortable with that role?"

"I don't think about my personal comfort. That's not an issue."

"Well, then you sound like a crusader."

"Well, no. I'm not crusading, either."

"Then you're acting as a conscience?"

Dorothy Denning pauses. "OK, maybe. I just want to make sure that the govern-

ment point of view gets understood for what it is. And not for what other people say it is."

In effect, Dorothy Denning is protecting the government with the same maternal fury that she once exhibited when she rushed to the aid of the hackers. Her motivations are really not about power, money, or even glory. She has made a personal connection with the law enforcers, the bureaucrats, and the spies, and her trust in them has enabled her to evaluate the evidence they present with what she considers a clearer eye than those outside the loop. Armed with what she believes is the truth, she's getting the message out.

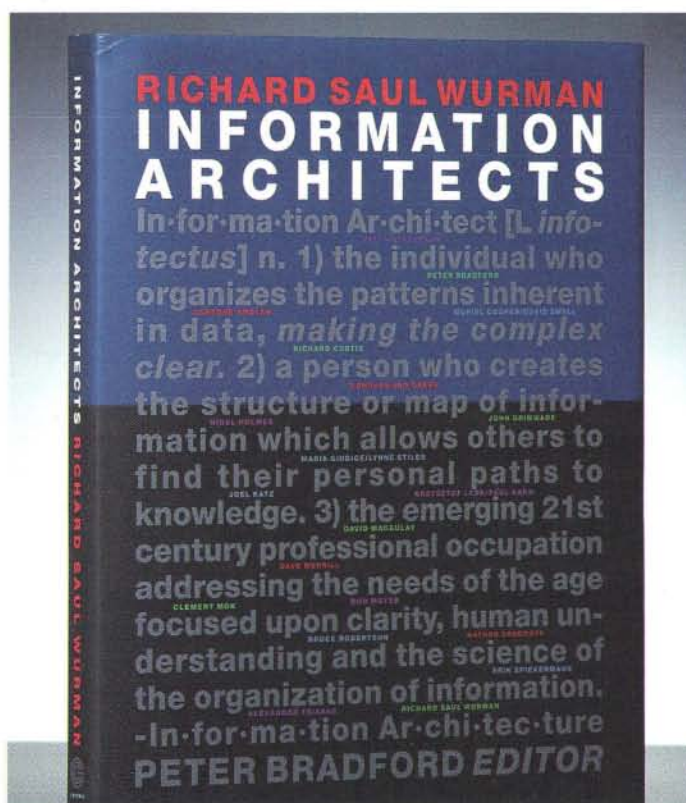
As a result, she thinks her work does make a difference, does have an impact on society. Her critics may think that she's wrong, that she's pedantic, that she's a stooge for Big Brother. But don't make that argument to Dorothy Denning. She's heard it already, and she's not buying it. Destiny has tapped the Clipper Chick on the shoulder, and she's hellbent on living up to the responsibility. ■ ■ ■

# The design of understanding

There is a tsunami of data that is crashing onto the beaches of the civilized world. This is a tidal wave of unrelated, growing data formed in bits and bytes, coming in an unorganized, uncontrolled, incoherent cacophony of foam. None of it is related, none of it comes with any organization methodology.

As it washes up on our beaches, we see people in suits and ties skipping along the shoreline, men and women in fine shirts and blouses dressed for business, all getting their shoes wet and slowly submerging in the dense trough of stuff. Their trousers and slacks soaked, they walk stupidly into the water, smiling—a false smile of confidence and control. The tsunami is a wall of data—data produced at a greater speed, greater and greater amounts to store in memory, amounts that double, it seems, with each sunset. On tape, on disks, on paper, sent by streams of light. Faster, more and more and more.

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# Starbright

◀ 175 tionship with children, can do," he says. "If we proposed this, we would have been viewed as being very invasive. A bunch of geeks, people in white coats (although I don't think any of us have white coats), not really caring about the kids, but wanting to instrument the kids and treat them like objects. I don't say we *would*, but I think that's how we would have been perceived."

Steven Spielberg, content provider extraordinaire, lured the sponsors, lured the big donors, lured the reporters. Just his name has lured the shy kids online, as child life specialists hold out the prospect that kids might run into Spielberg – in the form of his avatar, E. T. ("Running into Spielberg" is no mean feat: weeks of calling didn't get *Wired* an interview.)

The director's own Starbright experience drives home the cost of this technology. He only got a Starbright terminal in March.

## "That's me?" asks Vanessa's younger brother. "I don't get it."

### Oh ... we're *connected*? I can see you?"

Since a DS3 line would have cost perhaps \$50,000 to install and \$7,000 to \$8,000 a month to run, an ISDN line was installed in Spielberg's office. He gets 7 to 8 video fps, instead of 15, and a quarter-second delay, but all features offered to kids are there.

This compromised rig is itself a bit of a beta test: it may show whether Starbright's projected Phase 2, in which Starbright kids will get access from home, probably over ISDN lines, will work.

Half a dozen hospitals are participating in Phase 1: Lucile Packard, Mount Sinai Hospital in New York, Children's Hospital of Pittsburgh, and hospitals in LA and Washington, DC. (As this article went to press, a Boston hospital had dropped out of the program, and Children's Medical Center of Dallas went online.) As new hospitals are added, Starbright looks for more donors.

**E**mma, Marie, and Vanessa turn to the subject of hospital playrooms and activities. "A lot of crazy stuff goes on

here," says Emma enthusiastically. "Somebody sent us these!" She jams a figurine against the screen. "It's made from a peanut and it's got a top hat on. Isn't it neat? I'm all the way in Pittsburgh and you're all the way in California. Is it dark there yet?"

"No."

"We're going to show you Rachel painting the windows," declares Emma, a media natural. She rips the videocamera from its Velcro mount and carries it around, showing Rachel standing on a chair painting snowflakes. "She said Hi! Rachel, don't fall off! She said she's already in the hospital!"

**C**hildren in isolation during bone-marrow transplants give perhaps the most striking example of the sorrowful conditions Starbright is meant to alleviate. They live in a small, sanitary room for four to eight weeks, seeing few, certified-healthy visitors. Their strength is low and their spirits are apt to be lower. Severe

mouth sores make it painful to talk on the phone. Child life workers on transplant wards ache to get isolation rooms wired.

Such patients got Starbright its highest-profile fundraiser: when Norman Schwarzkopf was first approached by Samuelson and Spielberg to raise money for Starbright, he declined. Though he'd worked with camps for sick children, he was involved in so many charities that he didn't want to take on another. Then, after a fundraiser at a Florida hospital, he visited the children's ward. In the transplant unit he found Heather, a child he knew from one of the camps. "She was lying there in the bed in the fetal position, totally isolated from the entire world, with no companionship whatsoever," Schwarzkopf says. "What she wanted to talk about was camp and the one time when she'd been allowed to just be a kid. I suddenly realized that if we could have Starbright World in that room with her, she wouldn't be isolated, she'd be able to escape. So I called up

Starbright and said 'OK. Where do you want me to start?'"

**E**mma, Marie, and Vanessa discuss birthdays and favorite authors and then happen on the subject of brothers – how many, how old, how tolerable. Marie and Vanessa have serious complaints, and Emma joins in – just to be companionable. When Marie says that brothers are always in your face, Vanessa answers emphatically, "Tell me about it. It's true. They never leave you alone."

"They're always in your business," says Emma.

"And they never come see you in the hospital!" exclaims Marie. "They always have excuses."

This produces heated discussion. "My brother comes every night," says Vanessa. "Except he comes and he doesn't spend any time in the room, he's always outside playing."

Later, after the kids in Pittsburgh – in a later time zone – say good night and log off, Vanessa's younger brother arrives. He asks to see Starbright, and they sit at adjacent stations. She shows him how to enter Tropical World and take the rainbow to Sky World.

"It's cool," he says, authoritatively. "Neat graphics."

Both Palo Alto workstations are represented in VR by an avatar in the form of a helicopter. (Later, kids will have individual avatars.) "That's me?" asks Vanessa's brother. "I don't get it. Oh ... we're *connected*? I can see you?"

They explore Cave World, hunting for a huge stone face whose square mouth is a door that takes two people to open – so Vanessa has never been through. The environments are designed to foster cooperation, as Worlds producer Tamiko Thiel explains: "A lot of the therapeutic work with these kids is to get them to come out of their shells, come out of their concern with themselves and their sickness and start socializing again."

Together Vanessa and her brother open the door and come out in the sky.

**V**ideoconferencing is the first thing many kids want to try. Colette Case, a buoyant young woman with short dark hair who is the Starbright coordinator 232 ▶



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## Starbright

◀ 230 at Stanford, says she's astounded by the children's candor in videoconferencing. "They tell each other just everything. We sit there in awe." But when she asks Vanessa, "Do you think you guys would talk differently if there weren't people watching you?" Vanessa gazes at Case and slowly nods, nods, nods.

The corporate partners are eager to see how they use it. For decades, videoconferencing has been just around the corner, yet its use is confined to the business market. (Picture phones were just too expensive.) But now, they say, it's *really* around the corner. PCs make the difference, says Miller. Instead of buying a new system, users will need software and a \$50 camera for their PCs. "By the end of the decade, it will become unusual not to be able to communicate in some form of video communication from your office. It's going to be explosive." (ProShare 1.9 now retails

lines (equivalent to 672 voice telephone lines), and why it costs so much. "You've got people who believe that the real issue of getting a network to become a conferencing system is voice-driven, and the other group that says it has to be image-driven," says Pieper about the marketing issues Starbright is meant to illuminate. "We don't know. We truly don't know."

Justin Lamarche is in the BYOZ when he meets a blue bear in a green T-shirt and shades. The avatar represents Susan Prosser, who does tech support for Worlds out of Seattle.

Prosser and Justin know each other well. Justin's 12, wearing a black motorcycle T-shirt and purple shorts. The effects of chemotherapy show in his shorter-than-crewcut hair. He is at Children's Hospital in Boston and will soon go into isolation for a transplant. A rare smile reveals his tremendous dimples.

Prosser and Justin communicate in text

## The kids are helping Starbright's sponsors decide whether computer conferencing systems will be driven by voice or by image.

for around \$1,000.)

Robba Benjamin, president of Sprint's multimedia unit, agrees. "The features and functionality that we're giving the Starbright children are the basic features and functionality of the 21st-century phone." Starbright, as a test market, provides a way for Sprint to explore new markets, to look not at productivity in a business setting, but at what people like to do, at uses they consider improvements in their lives.

Yet one of the important features of Starbright is that kids *don't* have to be seen. In fact, some kids refuse the option. One child who was hooked to an oxygen tank said he preferred not to be seen.

Pieper of Tandem Computers wants to examine the possibilities of a network without ProShare, to find out whether video is critical or a frill. It's a key question. Ordinary phone lines would suffice for the virtual worlds and for text and voice communication, while ProShare takes a lot of bandwidth to give decent video quality. ProShare is why Starbright runs over DS3

superimposed on their avatars. They agree to head for Tropical World, where Prosser saw a Pittsburgh fish and a green car, the avatar for New York's Mount Sinai Hospital.

The trip from BYOZ to Tropical World takes time, because in the transition between worlds, there's a pause while the new one is loaded into memory. As Justin travels, he and his child life specialist, Paula Johnson-Grenier, discuss a drag race he just ran with some other kids. Johnson-Grenier has a serious demeanor and honey-blond hair. She is insisting, in the nicest possible way, that Justin ought to confess to cheating.

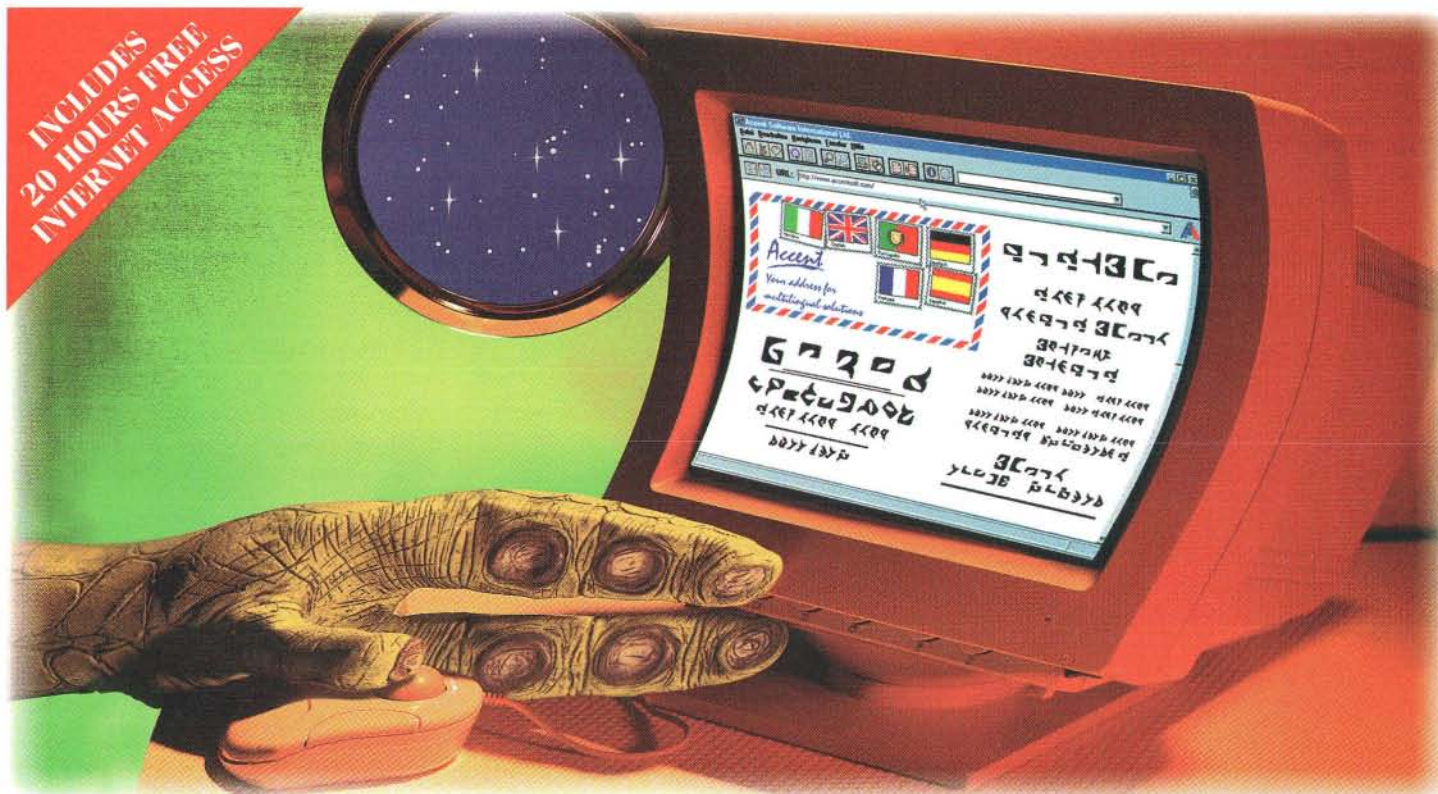
"I just pressed a little Alt," says Justin, with what looks like pleasurable reminiscence. Two nurses in hospital blues appear in response to a fit of beeps from Justin's IV monitor. Justin questions them. "You going to hang my bag now? I have to go back to my room or can you do it here?"

A nurse replies sympathetically, "I think I can do it here - are you busy?"

"Yeah. We're too busy to talk to 234 ►





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**Page 148** Mars *Pathfinder*: NASA; Tired Bono: FPG; Wired Bono: Ron Sachs/Archive Photos; Rodman: AP/Beth Keiser; Shrink-wrap: Douglas Adesko.

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**Page 152** High bandwidth: FPG; Low latency: Archive Photos; Bullock: Joyce Rudolph/MPTV; Goth: John Mantel/Sipa Press; Manhattan: Richard Laird/FPG; Galás: Catherine McGann; Tuvan throat-singing: Adrian Belic; Robot wars: Sean Casey.

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**Page 157** Orbital telescope: NASA; Active-optics telescope: Eric Sander/Gamma-Liaison; Drug reform: John Mantel/Sipa Press; Drug wars: Chris Brown/Sipa Press.

**Page 158** Nader: Brad Markel/Sipa Press; Graves: Michael LeRoy/Gamma-Liaison; Leonard: Bruce Birmelin; Dippé: Bill Zemanek; Federal agents: Jerry Hoeffler/*Fort Worth Star-Telegram*/Sipa Press.

**Page 159** Herbal ecstasy: Shahn Kermani/Gamma-Liaison; Wet chemistry: FPG.

## Starbright

◀ 232 blue coats around here. We only talk to white coats," he teases.

"Snob!" she exclaims.

Justin returns to discussing the race.

"I kicked their butts!"

**S**tarbright World isn't meant to be a snap to navigate. "You can either take the time to explore it yourself or you can ask some other kid and say, 'Hey, show me around,'" explains Thiel. "That's different from existing computer tools, where the whole idea is to be able to do something faster and easier."

Indeed, the most popular place in Starbright World, the BYOZ, is also the hardest to navigate, the chewiest – and the one that grants users the most control and most clearly bears the traces of their presence. In the BYOZ, you can move things, build things, or heap things up, and everyone can see what you've done.

## A child who is hooked to an oxygen tank or whose face is puffy from steroids may want to be invisible. Or be an avatar.

At first, two tricks got kids out of the BYOZ – using a portal in a checkerboard pavilion, or going to desktop level. Then a kid at Stanford found out how to move – and hide – the portal, leaving other users to make baffled runs at the place it used to be. Another kid went to the desktop and started changing things at the pixel level. Next version, desktop access was cut off and the portal was nailed down.

Thiel says some media people are so smitten by videoconferencing they ask if virtual worlds are necessary. "'Couldn't they just have the videoconference and that would be the same thing?' The answer really is No. It's pretty weird if you just all of a sudden telephone someone that you don't know and start talking to them. You need some sort of context, some sort of shared experience."

She tells of watching two boys using the system, "an older, bigger, really sort of bullying kid and another, much smaller, very quiet kid. The older kid said, 'OK, you know the space better, how about if you show

me around?'" She gloats a nerdlily gloat.

"The younger, quieter kid was the expert!"

"Always, the fear is that giving kids (or adults) computers will make them retreat into themselves and become less human," Thiel says. "The Starbright space has been designed to socialize kids."

**B**y the rainbow in Tropical World, the Pittsburgh fish hangs in midair, pouting powder-blue lips. It faces the Mount Sinai car, which races its wheels. Justin calls them, but gets no reply. The bear – Prosser – sends a message to Justin, suggesting they switch to video.

When they do, Justin says with apparent sincerity, "I think you should fix your hair, it's sticking up." Prosser runs a startled hand over her hair and blanks the screen, undoubtedly discovering that her hair is fine. Justin snickers.

The picture returns, and Justin describes a sign reading "HI BOSTON" that he and Johnson-Grenier built in the BYOZ, which

Prosser wants to see.

"It's over by the racetrack. When you first come out of the rainbow you should see it. It has big letters."

Justin abruptly hangs up to try to get through to New York. Later, he finds Prosser again in the BYOZ, and she types, "so where is this sign you spoke of"

"do you want to see the sign brat" He turns to Johnson-Grenier and asks, "I'm getting better at typing, huh?"

Justin agrees to show Prosser the sign if she begs.

"please oh please show me the sign Please mr Pony sir"

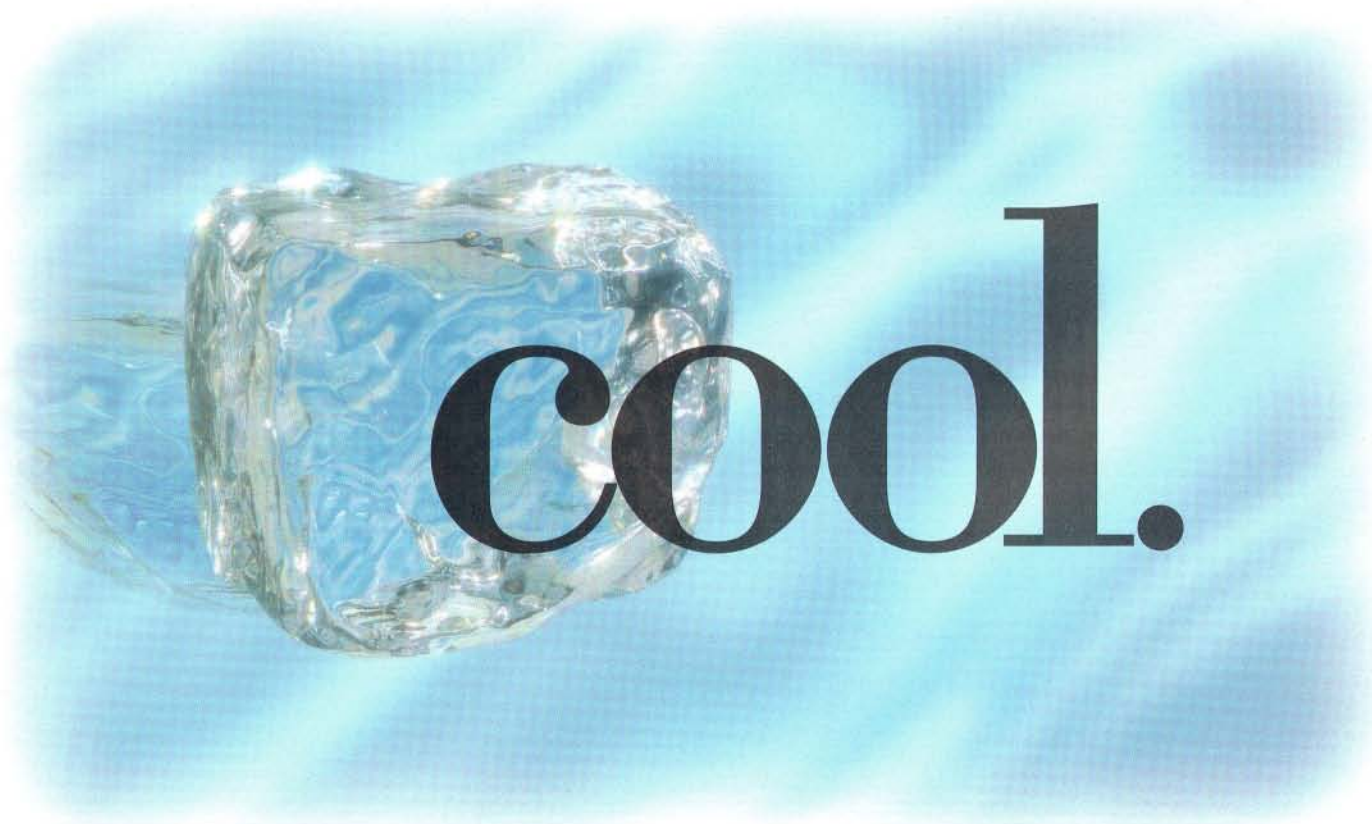
"well all right brat"

They set out, and Justin exclaims to Johnson-Grenier, "Let's try to lose her!"

Justin changes his style depending on who he's talking to, Johnson-Grenier says. He teases people his own age, eases off with younger kids. Starbright has discussed having monitors in case one kid harasses another. "But they're all pretty sensitive to what other kids are going 237 ▶



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## Starbright

◀ 234 through, because they're going through the same thing," says Ugarte. "I've never witnessed a malicious moment."

"I came into it with a somewhat idealistic idea of what we were going to do and have been brought down to earth," Ugarte adds. What brought him to earth? "The day-to-day things that these kids go through and how amazingly they cope with them. We're giving them another tool to help them cope. But we're not saving these kids. These kids are saving themselves with everything they can."

**O**ne small study conducted at a Los Angeles hospital measured the pain medication taken by children who used Starlight Express Fun Centers. The children were patients who could self-administer small doses by pressing a button on a pump. The study, which Starbright points to with pride, found that children not only used less medication when using the Starlight Express trolleys to watch videos or play games, but also used less in the periods immediately before and after using the trolleys. The first decrease is thought to be due to anticipation, the second to a lingering distraction effect. Starbright representatives, from Samuelson to Schwarzkopf, say the drop in pain medication use was between 50 and 80 percent, depending how the data are interpreted.

The children said they preferred controlling their pain with videogames to using medication, which usually has disorienting effects and may depress the immune system. (While it's rare in children, the medicine can also be addictive.)

Unfortunately, the Starlight Express study is not an impressive model. It looked at only 28 children, and there was no control group. Because of limited availability of the trolleys, the kids could use them no more than two hours a day, and the study didn't look for a decrease in the total amount of medication.

When Starbright Worlds gets out of beta, a massive medical research program – to include control groups and to be much larger – will look at its effects on use of medication, length of hospital stay, and frequency of "positive outcome," according

to Dr. Mel Marks, who oversees the health applications and research component of the Starbright Foundation.

"These major investments in technology and resources are going to have to be justified extremely carefully by the most rigorous measures of outcome," Marks says. "We want to be careful not to divert millions of dollars to what is right now an experimental technique."

What if Starbright can't show health benefits? "We have Apple computers now, where the children can do their schoolwork or play games," says child life specialist Johnson-Grenier. "I could never claim it decreases their use of nausea medicine or something, but I certainly think it makes their stay in the isolation room better."

Asked about the importance of measurable health benefits, Schwarzkopf exclaims, "I don't care whether there are measurable benefits!" Calming, he reviews the hoped-for advantages, but adds, "I gotta tell you, all that sounds good, but as far as I'm concerned, if we can just cause one child to be relieved from the terrible suffering that they're going through, it's worth every nickel."

**I**n Justin's HI BOSTON sign, each letter is on a separate block, each in a different typeface.

"I like this sign," Prosser types.

Paula Johnson-Grenier warns Justin that it's time to log off. As a nurse takes his blood pressure, he finds Susan Prosser's bear avatar in the BYOZ and types "brat are you going to be here tomorrow"

"maybe maybe not depends on how nice you are to me"

"do you want me to beg" He turns to us.

"Watch what I say if she says yes!"

"It may help" Prosser responds.

"i forgot my standers are to hi" he grins enormously and types, "brat"

Urgently struck by an idea, Justin tells Johnson-Grenier he'll pretend to be her. "this is paula what time do you want to talk tomorrow and work some kinks" he types.

"I am flexible what's better for you" comes the reply.

After consulting Johnson-Grenier, he types, "200-400 500-800"

"ok i'll be hanging around the tropical world" types Prosser.

"see you then brat" ■ ■ ■



Message 39:  
 Date: 9.1.96  
 From: <nicholas@media.mit.edu>  
 To: <lr@wired.com>  
 Subject:

Shipping bits will be a crummy business. Transporting voice will be even worse. By 2020, there will be so many broadband paths into and out of your home that competition will render bandwidth a commodity of the worst kind, with no margins and no real basis for charging anything. Fiber, satellites (both stationary and orbiting), and all sorts of terrestrial wireless systems will pour bits galore into your home. Each channel will have so much spare capacity that measuring available bandwidth will make as much sense as counting photons passing through a window.

Scarcity creates value. Since fiber (including transducers) now costs less than copper (except for the shortest lengths), we will be installing fiber even if we do not need the bandwidth it provides. POTS, plain old tele-

## The Future of Phone Companies

called *hello girls*. While we have no hello girls today asking, "Are you finished?" we still use *hello* far too often. In fact, you never really want to say hello all by itself on the telephone. It is fine for face-to-face greetings, but said on the phone, it means you don't know who is calling, or why they are calling in the first place. That makes no sense. Your digital butler should say hello, not you.

Furthermore, why call at all? Sure, it may be important for many purposes, often for emotive reasons. Yet consider the alternatives now available. Federal Express's Web site is a nice example. Until recently, I would call an 800 number to ask a human if the 10-digit domestic or 12-digit foreign waybill number could be traced, then I would hear typing in the background. Now, I click a few times on the company's Web site and am

For example, I can perform operations locally or remotely. Once I go remote, there is no difference – the network, switches, servers, and other's personal computers all look the same. They are the "elsewhere."

This is important because whoever has the pulse of the network may be in the best "elsewhere" position, as more and more gets pushed into the network for one reason or another. Today, so-called network computers are being advocated to lower the cost at the periphery. Video-on-demand is attractive just to be rid of the VCR and the clutter of videocassettes. I would instantly push my alarm clock into the network, where it could have access to weather, airline delays, traffic reports, snow cancellations, and any other kind of information that could affect the time I should get up. Yes, I would pay the phone company some money to wake me up, and a lot more not to wake me up, when possible. That's added value.

**Saying hello on the phone means  
 you don't know who is calling  
 or why they are calling in the first place.  
 That makes no sense.**



phone service, is better served and more inexpensively installed and maintained using fiber. Japan will have it in every home by 2015. There will be such a glut of bit-transportation capacity that vendors will be giving it away to get you to buy something or just to look at advertising. And we will soon be exchanging bits among ourselves that represent almost anything but real-time voice traffic.

### Voiceless telephony

Today, the telephone companies take the *phone* in their name far too seriously. For example, they worry about Internet-based telephony without realizing that their real problem will be the reduction of real-time voice traffic in the digital age. Our great-grandchildren will be astonished and amused when they recall the waste and financial loss incurred at the end of the 20th century playing telephone tag. Their telecommunications world will be far more asynchronous than ours and will be based mostly in ASCII, not in audio or graphic renditions of it.

"Hello?" The word is with us thanks to the telephone. Early telephone operators were

much more satisfied with the quick, direct reply. The Relais & Chateaux hotels have been on the Web for more than a year and a half, so I have stopped calling them.

Just think: all of these transactions and many more once required phone calls. In fact, this extends to people. If your circle of acquaintances are online, you call them much less. In my own case, I place less than five calls a day and receive as few. With my mother online, we call each other less but communicate almost daily.

### Don't sell your phone stock yet

While I may not expect to pay anyone for moving my bits, I am prepared to pay handsomely for value added to them. By this I mean any of the following: filtering, prioritizing, sanitizing, authenticating, encrypting, storing, translating, or personalizing, to name a few. My colleagues will argue about where such value should be added: in the network or at the periphery? As an extreme decentralist, I will argue that as much as possible should be done at the periphery. But then, I look at it this way: if I am on the periphery, the "center" looks exactly the same to me as others on the periphery.

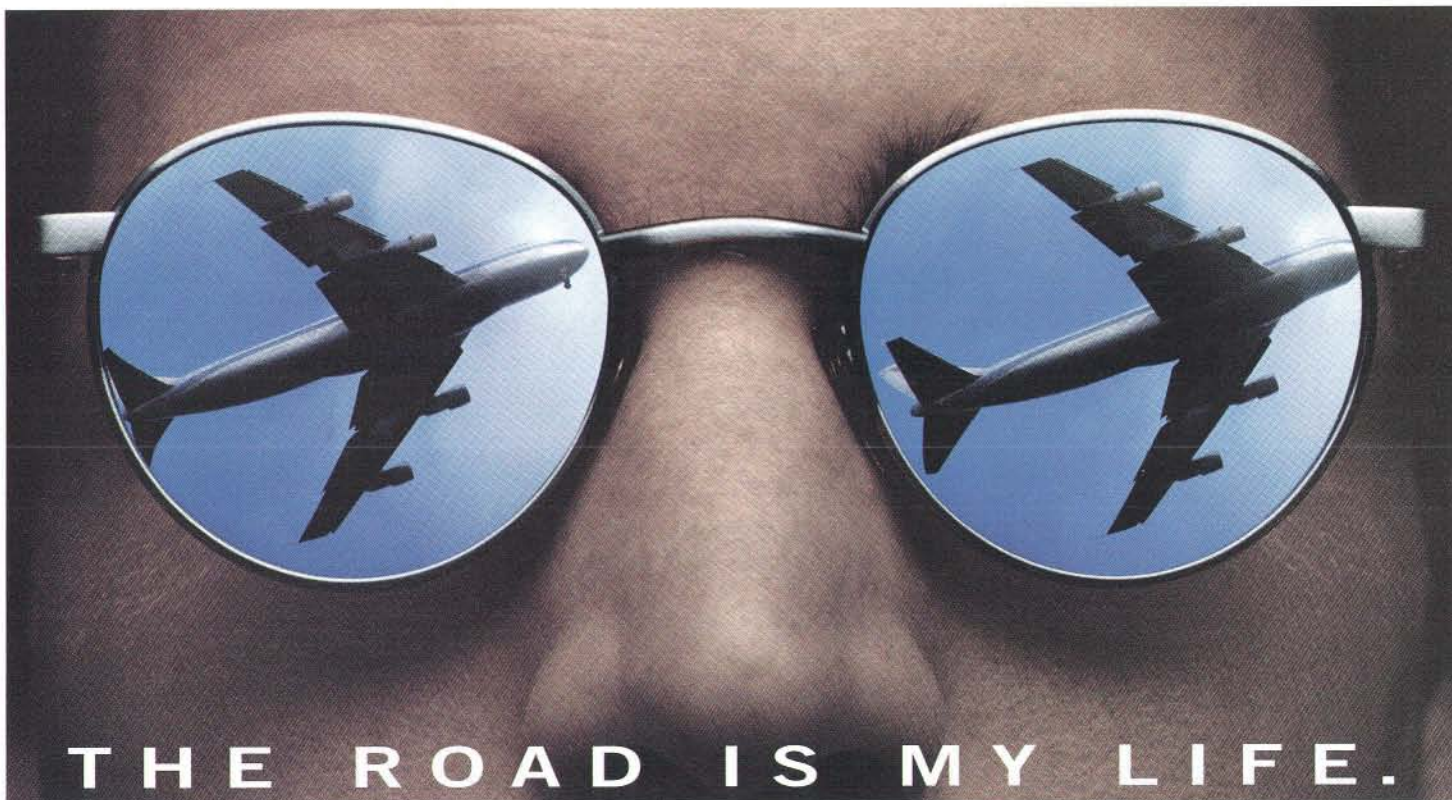
### Mouse potatoes

I truly believe that during prime time in 2005, more Americans will be on the Net than will watch network television. NBC, CBS, ABC, Fox, and CNN could by then be doing more business on the Web than via broadcast. Under these conditions, a telephone company stands to profit handsomely. And it does not have to own content – a common belief just five years ago.

CNN does not want to personalize the news. It has enough trouble gathering it from around the world – and you don't necessarily want to limit your input solely to theirs. One hundred million news-reading and news-watching Americans will soon realize the possibilities that can be derived from looking at 100 million different editions of the news – something the phone company could make possible. In fact, content providers are not well suited to deliver tailored news, as they are per force focused on their own. I bet you would pay your phone company a few dollars a day for a news service, perhaps print in the morning and video in the evening, whose stories combined headline news and items of personal interest. In fact, this could be an ironic example of added value: I would pay my telephone company more to give me fewer bits, but the right bits. Wouldn't you? ■ ■ ■

*Next Issue: Electronic Word of Mouth*





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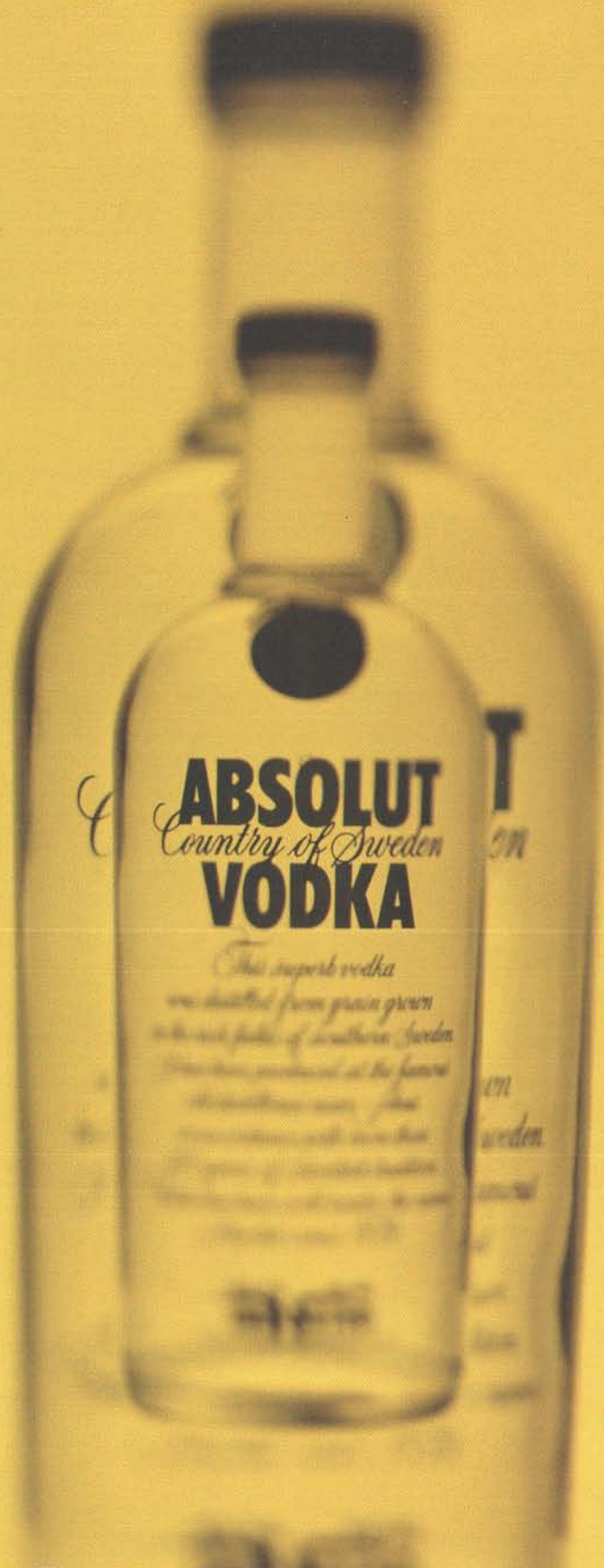
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